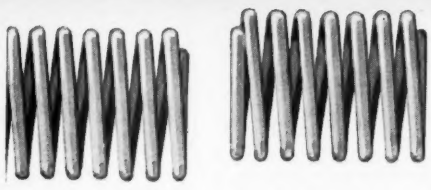

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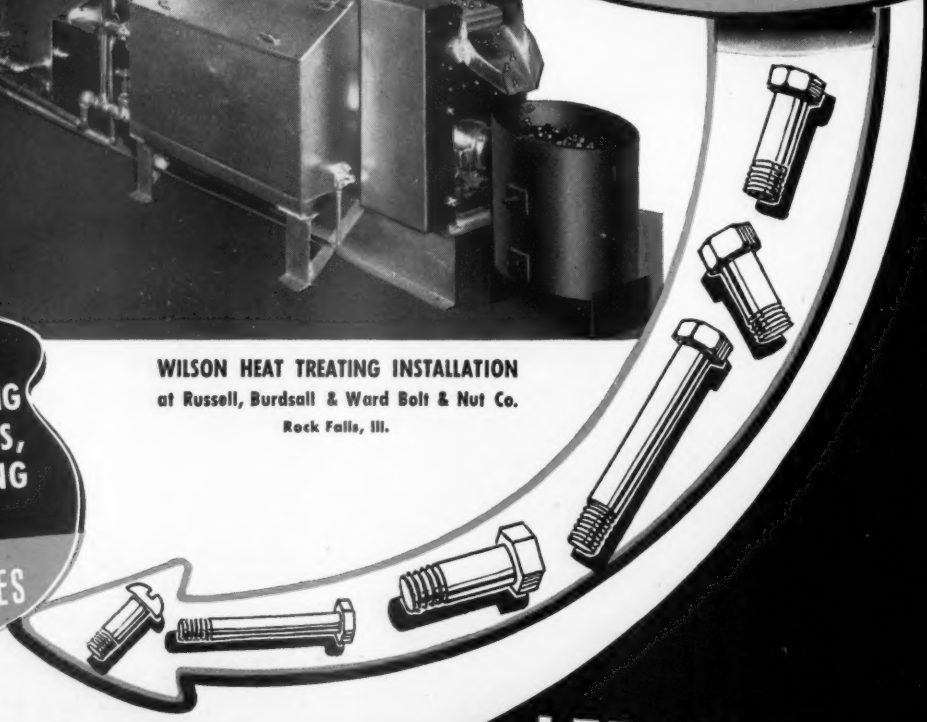

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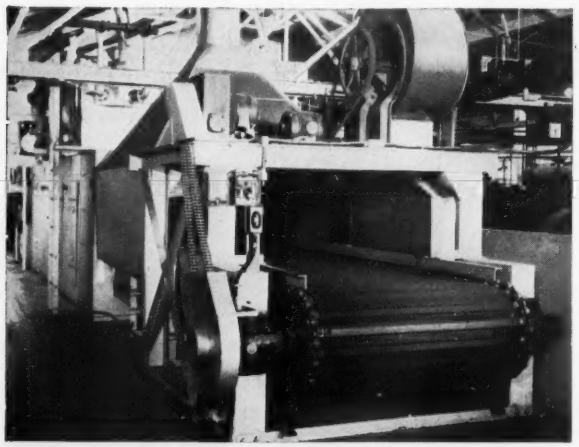

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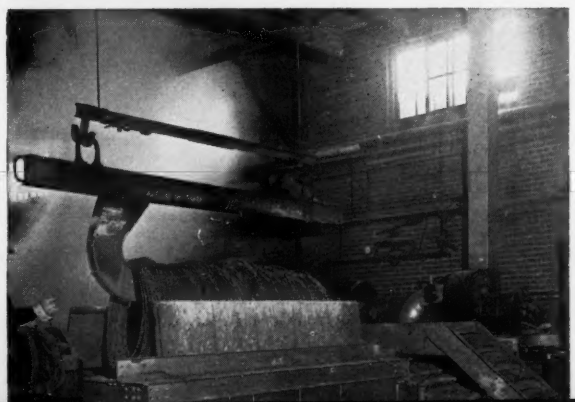

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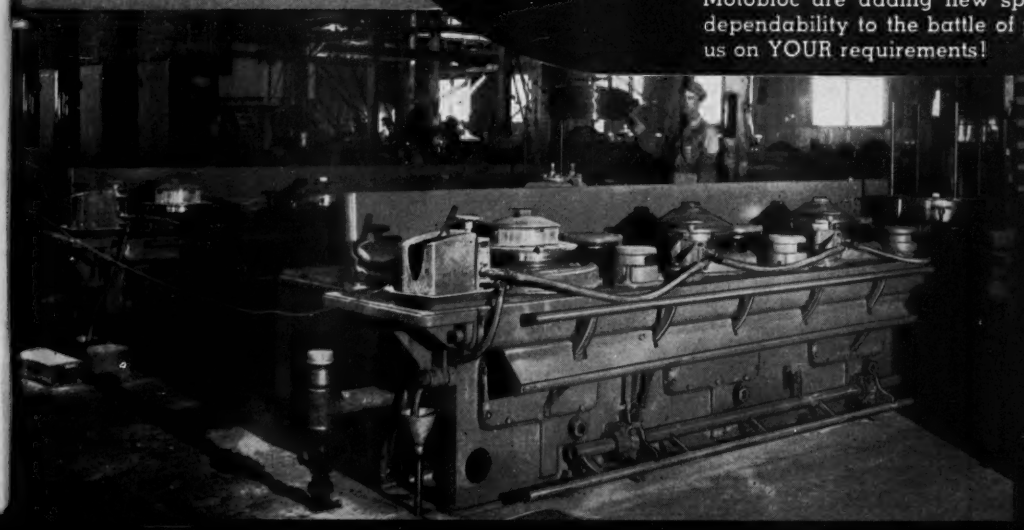

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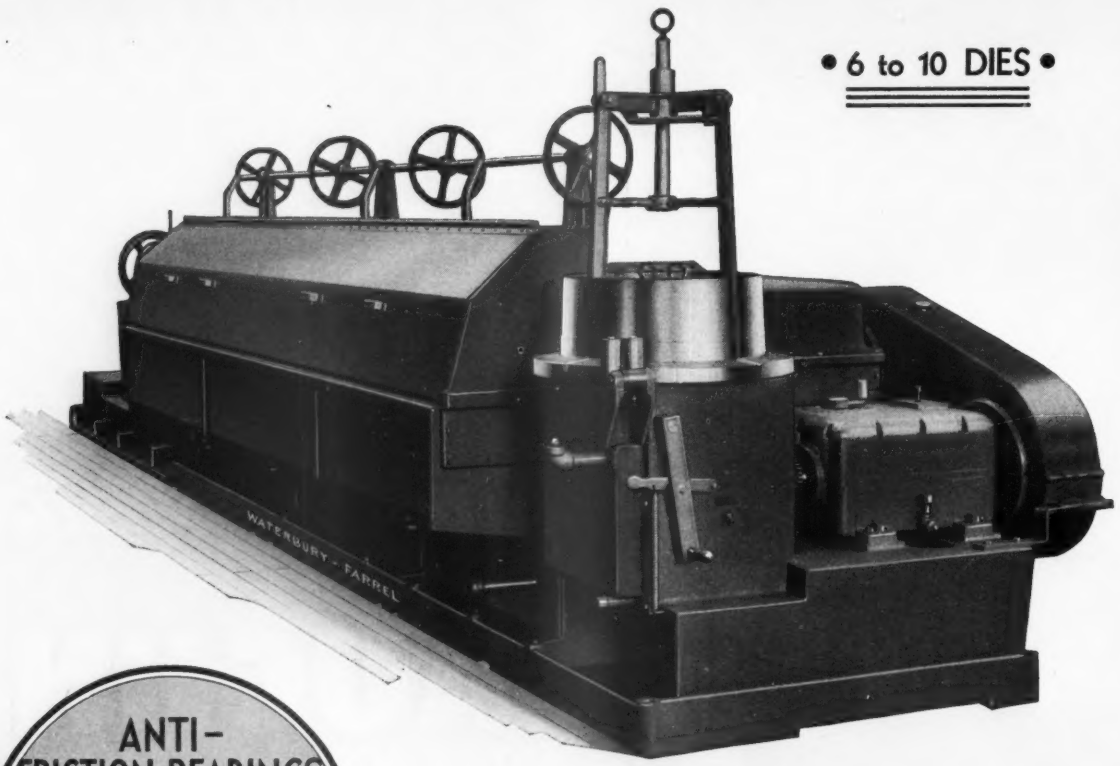

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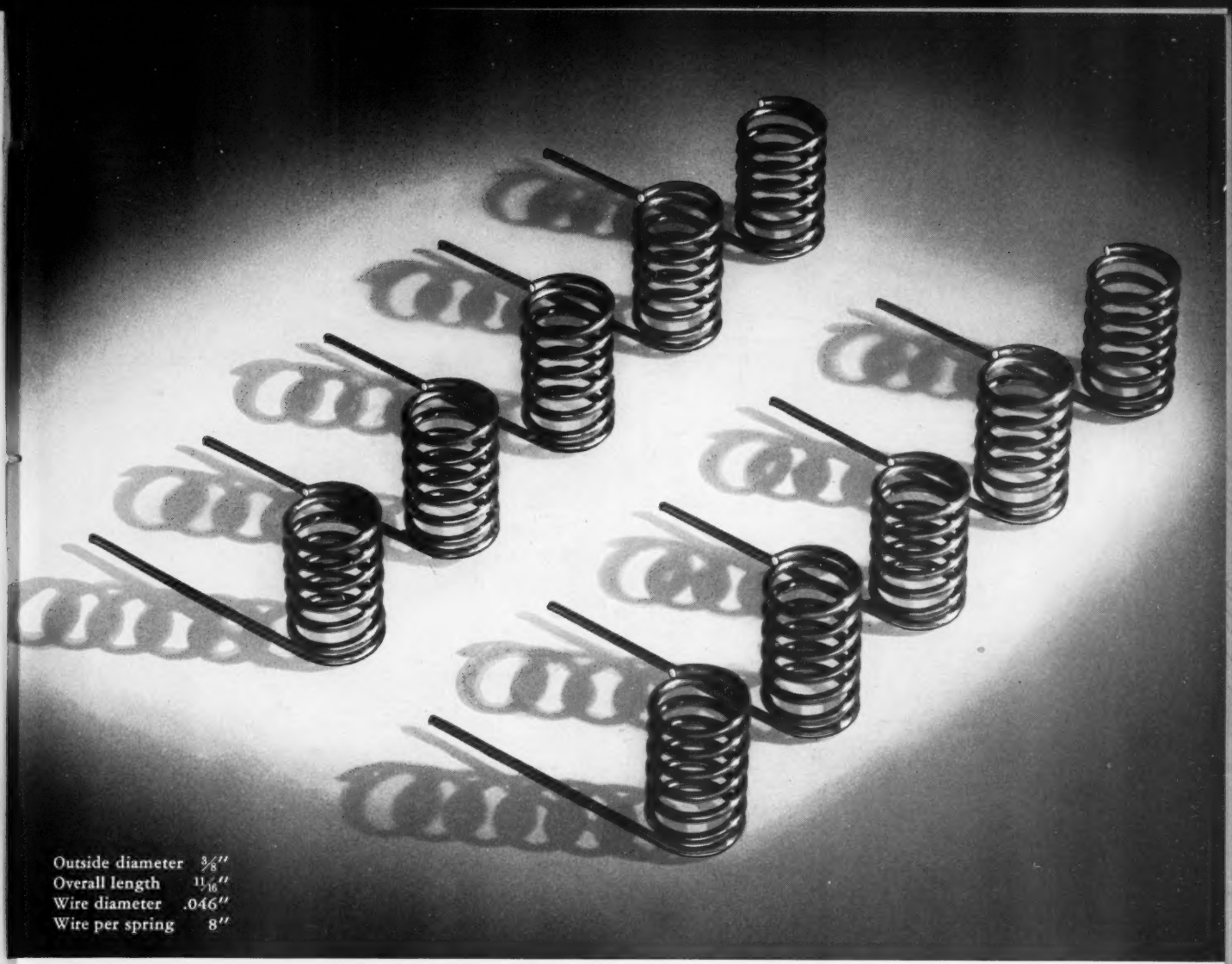

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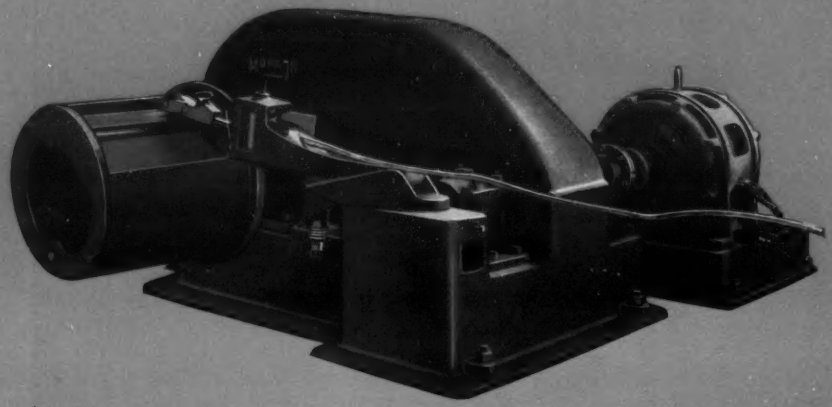

WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable

DRAWING—ROLLING—EXTRUDING—FORMING—FABRICATING

Vol. 17 APRIL, 1942 No. 4

Designated as

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A monthly publication devoted to the production of Wire, Rod and Strip.
Wire Products and Insulated Wire and Cable.
DRAWING --- ROLLING --- EXTRUDING --- FORMING --- FABRICATING

Vol. 17 APRIL, 1942 No. 4

A Method For Measuring The Contours of Wire Drawing Dies

By L. B. Barker,
Schenectady Works Laboratory, General Electric Company,
Schenectady, New York

An apparatus recently developed for the purpose of weeding out all standard dies and checking changes in manufacturing processes together with the results obtained at the Schenectady Wire Mill of the General Electric Company, is described here.

MODERN methods for producing wire drawing dies rely largely on machine set-ups for developing the desired approach angle, bearing length, relief and other dimensions which, taken together, form the contour or working surface of the die. Under such an arrangement it might be assumed that a correct set-up would produce a correctly shaped die. It is a matter of common experience that such is not always the case. Aside from errors in set-up, a too vigorous application of the polishing stick may produce deviations in contour which make the die totally unfit for service. Dies which are markedly off standard may increase costs and impair quality in ways which are not always readily detected, and a defective die may do a serious amount of damage before its condition is discovered. It follows that good quality control in the wire mill requires a convenient and accurate means of measuring die contours.

THE apparatus described here was developed for use in the Schenectady Wire Mill of the **General Electric Company** and has proven very effective in weeding out off-standard dies and in checking the results of changes in manufacturing technique.

✦ ✦ ✦

IT consists of a bench-type Jones and Lamson comparator fitted with special viewing screens and various accessories to be referred to later. The measuring range covers cemented tungsten carbide dies from 0.325″ to 0.064″ and diamond dies from 0.072″ to 0.010″.

✦ ✦ ✦

OUR experience with cemented tungsten carbide dies has been that the most troublesome variable is the bearing length. A nib which had a normal bearing after rough coring might have little or no bearing after finishing, due to over-polishing. Also, a bearing which appeared to be normal on visual examination would on close inspection prove to be slightly conical. Information on these details is quickly obtained with the arrangement shown in Figs. 1 and 2.

✦ ✦ ✦

MEASUREMENTS are taken directly from the die itself which is mounted on a mechanical stage, providing both vertical and horizontal traverse. A dial indicator mounted on the stage provides a means for measuring the axial movement of the die. A short length of 0.040″ drill rod is firmly mounted in the support at the left of the lens and extends through the object plane of the lens into the bearing of the die. The free end of the drill rod is formed into a fine pointed tip which projects downward and provides the point of contact. As the die is moved along its axis, the deflection of the drill rod is observed

Designated as Official Publication by the Wire Association

Figs. 1 & 2. Screw-thread comparator fitted up for measuring the bearing length of wire drawing dies.

by the movement of its projected image on the ground glass.

✦ ✦ ✦

WITH a properly shaped die the surface of the bearing will be cylindrical in shape and there will be no movement of the image while this part of the surface is passing under the contact. Measuring the length of the bearing is then simply a matter of noting the points at which there is a perceptible movement of the image and the corresponding readings of the dial indicator. With a lens system having a magnification of 100X it is possible to check the bearing surface to within 0.0001".

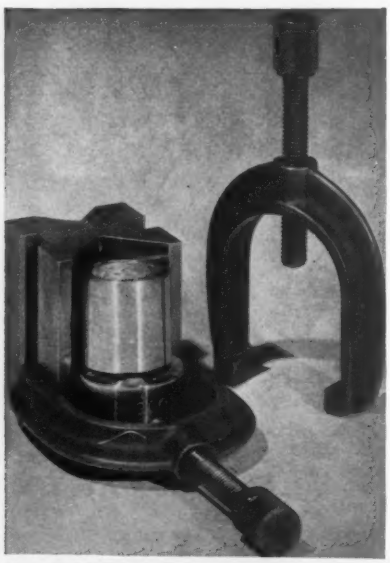

Fig. 4. The die with insert in place has been clamped in a V-block and a brass mounting cylinder placed on top. ✦ ✦ ✦

WHEN a complete picture of the die contour is desired, a cast is made of either Wood's metal or plaster of Paris. The cast is made in such a way that the entire contour of the die is reproduced. The procedure is shown in Figs. 3 to 6. Wood's metal is the more convenient of the two materials to use, but a slight and unpredictable amount of warpage may occur during the casting process. A special quick-setting type of plaster of Paris known as Hydrocal has been found to be free of warpage as measured with this equipment. The procedure for making Hydrocal casts is the same as for Wood's metal.

✦ ✦ ✦

THE finished cast is mounted on the mechanical stage as shown in Fig. 7. The vertical movement of the cast is measured directly by the dial indicator

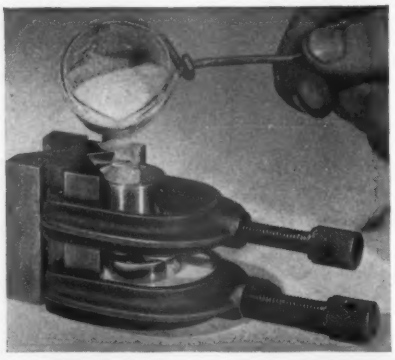

Fig. 5. Die and mounting cylinder clamped in V-block ready for pouring. Note that this arrangement provides the necessary axial alignment of the die and cylinder. ✦ ✦

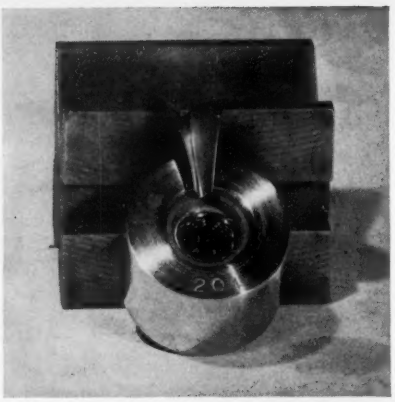

Fig. 3. Drawing die and insert. The insert is cut from a strip of 0.005" commercially hard copper, and is so shaped that its edges approximate the contour of the die. When placed in position in the die (Fig. 4) its edges make a firm contact with the working surface and confine the Wood's metal to a relatively narrow but representative area extending the entire length of the contour. The free space remaining in the cavity permits the withdrawal of the cast. ✦ ✦

shown in position above the cast. The projected image of the cast is shown in Fig. 8. The screen is marked with a horizontal and a vertical line; the latter being ruled off with divisions representing 10 mils at the magnification used (12½X). The image is adjusted so that the bearing coincides with the horizontal line, and the dial indicator is set at zero. The image is then raised until the indicator reads an amount corresponding to half the difference between the diameter of the die and the preceding die. The intersection of the horizontal line with the image then represents the point at which the surface of the incoming wire strikes the die.

Fig. 6. The finished cast. The left hand side of the cast conforms to the die contour. Note that the Wood's metal has flowed into the relief, thus providing a complete outline of the bearing. ✦

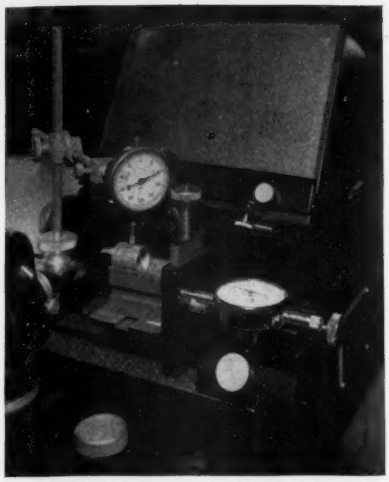

Fig. 7. Cast mounted for projection. ✦

The approach angle can be measured in various ways. We have found it convenient to use a cellulose acetate plate ruled with a series of lines forming progressively increasing angles with the horizontal. The first line represents an approach angle of 8°, and so on up to 48° by 2° increments. With this angle plate superimposed on the viewing screen, the image of the cast is shifted until the approach coincides with one of the lines and the approach angle read directly.

✦ ✦ ✦

A PERMANENT record of the contour can be made by placing a sheet of photographic paper on the screen, exposing for approximately 30 seconds and developing by the usual procedure. Photographs of off-standard contours are shown in Fig. 9.

✦ ✦ ✦

A METHOD for measuring the approach angles of diamond dies was described in a previous article (Wire and Wire Products, April, 1939). This same method is used with the present equipment with a few modifications. The cast is mounted in a brass cylinder following the procedure used for cemented tungsten carbide dies. The viewing plate of the earlier method has been replaced by a similar transparent plate ruled with the same group of lines. This plate when in position on the viewing screen is used for locating the point on the image corresponding to the surface of the wire entering the die. The approach angle at this point is then determined with the angle plate described above. No provision has been made so far for measuring the bearing length of diamond dies. Most of our troubles with off-standard diamond dies have been due to high approach angles and we have found that dies meeting reasonable tolerances in this respect were satisfactory.

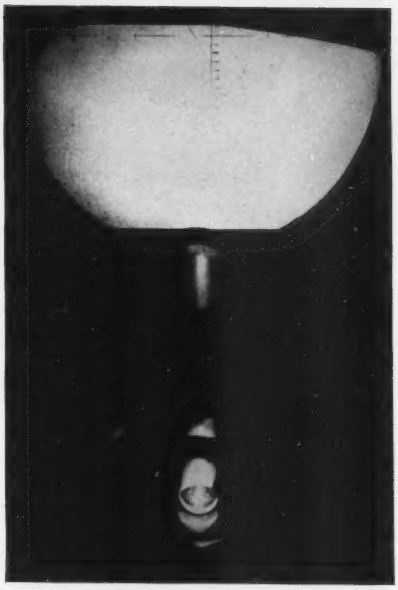

Fig. 8. Projected image of cast. ✦ ✦

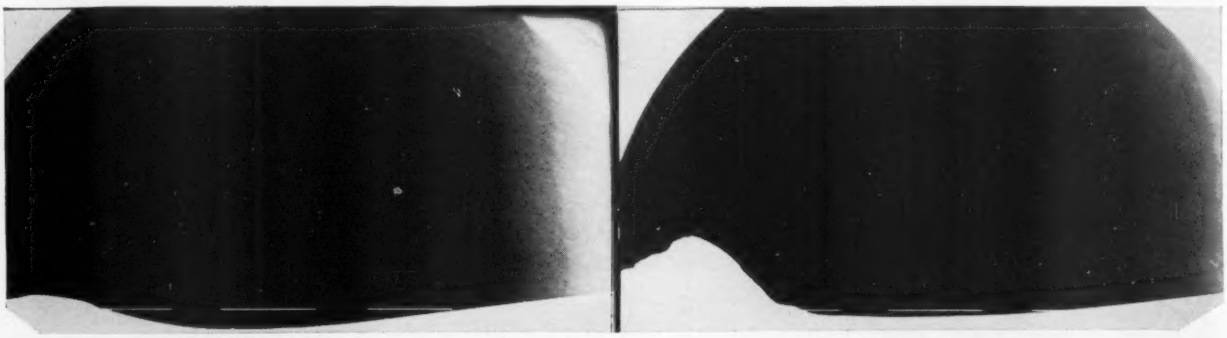

Fig. 9. Photographs on casts at 25X showing: a. No bearing b. conical bearing

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NORTON ABRASIVES

A Study of The Effect of Core Wire Temper On The Quality of Welds In Nickel, Monel and Inconel*

By F. G. Flocke and K. M. Spicer

Development and Research Division, The International Nickel Company, New York, N. Y.

Abstract

THE object of this research has been to determine the effect of variations in the temper of core wire of welding electrodes on the electrode arcing characteristics and on the mechanical properties of nickel, Monel and Inconel welds.

✦ ✦ ✦

A SINGLE melt of each of three materials—nickel, Monel and Inconel — was produced in four tempers of 5/32-in. core wire: (a) soft, (b) 15 per cent cold reduction, (c) 30 per cent cold reduction and (d) "as drawn." All wires of each material were covered with the standard extruded flux coating for that material, dried and ground for 18-in. end grip electrodes.

✦ ✦ ✦

TEST plates of each material, the same as used for U. S. Navy Qualification tests, were prepared for each of the four wire temper electrodes. Weld quality was examined by tensile and bend tests and micro-examination.

✦ ✦ ✦

THE electrode wire temper had no effect on the mechanical properties of welded joints, and no important effect on the arcing characteristics of the electrode. ✦ ✦

Introduction

THE question of the effect of core wire temper on both arcing characteristics and weld quality has been advanced frequently by electrode users. The object of this paper, prepared under the direction of Committee VII, Nickel Alloys, Industrial Research Division of the Welding Research Committee of the Engineering Foundation, is to present the results of research to determine the effect of the temper of core wire of welding electrodes on the mechanical properties of nickel, Monel and Inconel welds. The work has been confined to electric arc welding.

✦ ✦ ✦

PRESUMABLY the only way in which the core wire temper could affect weld quality would be through influencing the arcing characteristics of the electrode. While variations in core wire temper would be accompanied by slight differences in electrical resistivity, such changes would not be expected to alter electrode workability sufficiently to be reflected in lowered weld quality. It seemed, nevertheless, desirable to obtain specific data to ascertain whether or not core wire temper is an important factor.

*A paper presented at the Annual Meeting, A. W. S., Philadelphia, Pa., Oct. 20 to 24, 1941. Contribution to the Industrial Research Division, Welding Research Committee and published in the March, 1942 issue, of "The Welding Journal". Published by permission of the American Welding Society.

Procedure and Test Results

Electrode

A 5/32-in. diameter electrode was selected because of its all-around usefulness. The four tempers employed for this test were soft, 15 per cent and 30 per cent cold reduction and "as drawn". Since it is necessary to maintain extremely close tolerances on concentricity of flux coating (±0.003 in.), a precision-straightened wire is needed and, to maintain the straightness accuracy required, a 15 per cent cold reduction wire is needed. Therefore, this choice for commercial electrode manufacture is entirely a practical one.

✦ ✦ ✦

THE chemical composition of the three electrode materials used in this test is given in Table 1, and the mechanical properties of the core wire in various tempers are to be found in Table 2.

✦ ✦ ✦

THE four tempers of each material were coated in the same batch of flux designed for that material, then subjected to the normal drying cycle. Since the original program called for automatic welding, the 18-in. rods were ground for end grip, although commercial electrodes were made as 18-in. center grip at that time.

Table 1—Chemical Composition of Core Wire

Material	Heat No.	C	Mn	Fe	S	Si	Cu	Ni	Cr	Al
Nickel	Y-1289	0.07	0.29	1.19	0.005	0.39	0.16	97.45	...	..
Monel	M-5663-J	0.12	0.80	0.39	0.005	0.23	28.91	67.43	...	1.66
Inconel	NX-3530	0.06	0.16	5.77	0.010	0.22	0.04	80.65	13.07	..

Joint

FOR convenience and because it represents a sound design, the test plate specified in the U. S. Navy Department specification for electrode and welder qualifications, and shown as Fig. 1, was used for all joints welded and tested. It was not possible to use the same melt of material for plate and welding rod because additional deoxidants are required in the welding rod core wire for the remelting during welding. The chemical composition of the ¼-in. test plates and the ⅛-in. backing plates of each material are given in Table 3, while mechanical properties of the plate are to be found in Table 4. Test plates of ¼-in. thick metal beveled for a 75° included angle, with a ⅛-in. backing strip were prepared for each of the four electrode tempers.

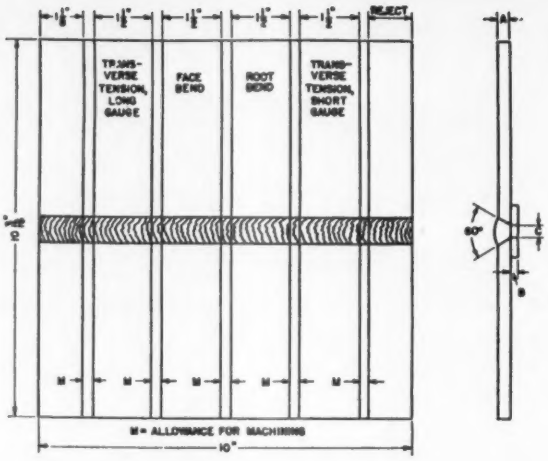


Fig. 1. Test Plate Used for All Welds.

✦ ✦ ✦

Welding

IT was planned originally to use automatic electric welding heads to eliminate the personal equation, but results obtained with two automatic heads were unsatisfactory. With the first head, largely because an oscillating attachment was lacking, it was necessary to deposit five to six passes automatically to complete a joint in ¼-in. plate, whereas normally two passes are the maximum required for manual welding. Because these non-ferrous electrodes were designed for all-purpose manual work, the weld metal does not flow too freely, nor does it spread rapidly, hence the manual electrodes did not lend themselves to automatic head use. Some welds made with this head were included in the program and were found to possess satisfactory properties. Their only shortcoming was the many passes required to complete the weld.

✦ ✦ ✦

THE second automatic head had an oscillating mechanism which operated nicely to close limits. However, practical difficulties were encountered in the form of a slow retracting relay, which caused freezing of the electrode in the initial attempt to establish an arc. This defect was common to the equipment.

✦ ✦ ✦

RESORT was made to manual welding and consistent results were obtained. Operating conditions during welding are recorded in Table 5.

✦ ✦ ✦

WELDING conditions were set for the 15 per cent reduction core wire electrodes, and these welded first since they represented

Table 2—Mechanical Properties of Tempers of Core Wire

Material	Temper	Breaking Strength, Psi	Elongation in 2 In., Per Cent	Reduction of Area, Per Cent
Nickel	Soft	80,450	43.0	79.3
	15 per cent	85,000	30.0	80.1
	30 per cent	104,000	9.0	74.1
	As drawn	128,450	7.5	68.8
Monel	Soft	92,900	37.5	73.0
	15 per cent	105,900	18.0	68.0
	30 per cent	128,450	6.0	65.8
	As drawn	131,300	5.0	60.5
Inconel	Soft	93,000	38.0	74.1
	15 per cent	110,500	20.0	69.7
	30 per cent	134,000	7.5	68.0
	As drawn	158,500	6.0	55.2

Table 3—Chemical Analyses of Plate Material

Material	Melt No.	C	Mn	Fe	S	Si	Cu	Ni	Cr
Nickel	N-6876	0.07	0.27	0.12	0.005	0.03	0.03	99.45	...
Monel	M-5494	0.14	1.05	0.86	0.005	0.05	30.69	67.17	...
Inconel	NX-3570	0.06	0.21	6.14	0.011	0.21	0.12	80.59	12.64

Table 4—Mechanical Properties of Plate Material

Material	Yield Point Psi	Breaking Strength Psi	Elongation in 2 In., Per Cent
Nickel	32,500	69,000	45
Monel	41,100	80,700	44
Inconel	40,200	87,500	50

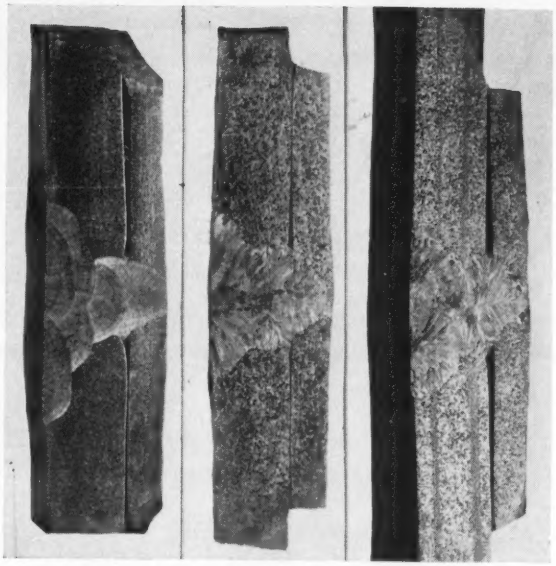
Table 5—Welding Conditions

Material	Voltage Across the Arc	Amperes
Nickel	24-25	160-180
Monel	24-26	110-115
Inconel	25-26	95-105

known conditions. As other tempers of wire were used, very slight or no modifications in welding amperage or arc voltage were required.

✦ ✦ ✦

THE arcing characteristics of the soft, 15 per cent and 30 per cent cold reduction core wire electrodes of each material were unchanged, but a very slight increase in drop frequency was observed in the electrode made with soft wire. Whether this condition prevailed entirely because of the temper or by some other factor is difficult to establish in view of the use of manual welding.



Monel Nickel Inconel

Fig. 2. Macrostructure of Welds Made with Electrode Having a 15% Reduction Core Wire. (1.75X)

✦ ✦ ✦

Machining of Specimens

EACH of the welded butt joints, ¼ x 10 x 10 in. was sectioned into desired test coupons and marked to permit the identification of the specimens with respect to the start of weld, as shown in Table A.

Table A—Machining of Specimens

Specimen No.	Approximate Width of Coupon, In.	Purpose
1	1	Discard, at start of weld
2	1½	Long-gage tensile
3	1½	Short-gage tensile
4	½	Macrospecimen and microspecimen
5	1½	Bend specimen
6	1½	Bend specimen
7	1½	Discard, at end of weld

✦ ✦ ✦

THE tensile test coupons were machined into standard long- and short-gage tensile test specimens, 1 in. wide in the reduced section and about 0.23 in. thick. The bend specimens were approximately 1½ in. wide and about 0.23 in. thick.

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IN machining, the back-up strip was removed by milling, the excess weld metal of the surface bead dressed flush to the plate, and a light over-all cut taken on both surfaces. The weld cross section and the plate cross section were therefore identical.

✦ ✦ ✦

Testing Procedure

IN the tensile tests, a speed of 0.067 in. per

(*Please turn to Page 203*)

Table 6—Mechanical Properties of Welded Joints

Metal	Electrode Wire Temper (Per Cent Cold Reduction)	Tensile Strength of Joints: Long Gage Breaking Strength, Psi.	Long Gage Elongation Across Weld (Per Cent in 2 In.)	Long Gage Notes on Fracture	Short Gage Breaking Strength, Psi.	Short Gage Elongation Across Weld (Per Cent in 2 In.)	Short Gage Notes on Fracture	Jig Bend Tests of Joints: Face	Root
Nickel	Soft	71,100	40	In plate, 1½ in. from weld	73,000	43	In plate, ⅜ in. from weld	OK	OK
	15%	71,100	41	In plate, 1½ in. from weld	72,800	42	In plate, ⅜ in. from weld	*	OK
	30%	71,100	40	In plate, 1½ in. from weld	72,700	41	In plate, ⅜ in. from weld	OK	OK
	As drawn	71,500	44	In plate, 1½ in. from weld	73,200	46	In plate, ⅜ in. from weld	OK	OK
Monel	Soft	81,000	41	In plate, 1 in. from weld	82,700	45	In weld, near boundary	OK	OK
	15%	81,200	43	In plate, 1 in. from weld	82,400	48	In weld, near boundary	OK	OK
	30%	80,700	42	In plate, 1 in. from weld	82,300	48	Partly in weld, partly in plate	OK	OK
	As drawn	81,100	43	In plate, 1 in. from weld	83,500	42	In plate, near weld	OK	OK
Inconel	Soft	87,700	36	In plate, 1½ in. from weld	90,500	30	In weld, near boundary	OK	OK
	15%	88,300	39	In plate, 1½ in. from weld	80,200	24	In weld, some blow-holes	OK	Fair
	30%	81,300	26	In weld, through gas hole	88,500	30	In plate, ⅜ in. from weld	*	OK
	As drawn	85,150	40	In plate, 1½ in. from weld	84,800	28	In weld, some blow-holes	*	OK

*Some pores apparent on surface before test. No cracks after testing but pores opened up.

The Supervision of Maintenance Costs

By Thomas W. Fazakerley
West Wickham, Kent, England

IN every organization where machinery is maintained and operated, it is possible for the total cost of the engineering staff to play a very important role in the determination of the profit-making capacity of the organization as a whole. Unrecorded and uncontrolled payments to engineers can rapidly mount to a total which may adversely affect the intrinsic trading situation.

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ANALYTICAL determination of the extent and the possibility of checking engineering remuneration is a subject which demands and which should receive constant consideration.

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Classes of Engineers

THE majority of factories would find it a matter of comparative simplicity to sub-divide and allocate their engineers' wages on the following bases:—

(a) **REPAIRS. This heading embraces all the repair work that is necessary following faults, breakdowns, etc.**

(b) **GENERAL MAINTENANCE AND SERVICING. Payments within this grouping would embrace all wages paid to those whose task it is to attend to routine maintenance, such as stokers, feeders, oilers, greasers, etc.**

(c) **MANUFACTURING. This classification incorporates those payments in respect of all work done for selling on to clients.**

(d) **CAPITAL. This naturally combines the remuneration for, and cost of plant and tools both made and purchased, together with their assembly, erection and installation.**

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IT is reasonably certain that in extensive organizations, these four subdivisions are capable of much greater breaking down.

Time Sheets

IT should be a natural procedure in any factory for every engineer to complete a daily time sheet which will give full details of all work executed and the time devoted to each job. These time sheets should be given a weekly check and should be initialled by the Chief Engineer before he passes them to the office for valuation. After valuation, the clerks normally sub-divide the totals and allocate each expense to a plant cost record. The office will, of course, be unqualified to query or doubt the authenticity of the various details which come to them and in view of the importance of the allocations being correctly posted, it is essential that the Chief Engineer accepts the responsibility of checking the individual time sheets thoroughly and does not simply initial them out of hand.

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Instruction to Engineers

GENERAL maintenance and servicing work will require no particular authority and instructions, but on the other hand, the execution of any other domestic job by the engineering staff should be preceded by instructions to the Chief Engineer who will be responsible for the allocation of the individual tasks to his staff. Regular insertion of the Instruction Number to the engineer should be made on each appropriate time sheet in order that the subsequent assessment of labour cost may be an accurate one.

Normal Time and Overtime

THE conditions of industry before the turning of industry to the execution of currently required Government goods normally necessitated the engagement of engineering staffs for periods over and above those of the manufacturing operatives. It was the after-hours activity of the engineering staff which permitted the achievement of production schedules and which allowed a continuity of production without intervening periods of shutting down for overhaul and repairs. If such were the conditions a year or so ago, how much greater is the value of the engineering staff today when factories are everywhere operating double shifts and frequently longer working hours. The odd periods during which plant can be handed over entirely to the engineers have enhanced the value of the extra remuneration which has to be paid to the engineering staff for their overtime work. Close check, however, must be kept on the actual outgoings for overtime remuneration, it being patent that a substantial value difference exists between the hourly cost of work done 'during' and 'after' hours.

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Purchase of Material

QUITE apart from the actual cost of the labour, consideration must be given to the purchases effected for the engineers, such purchase costs being of course a charge on each specific job or task. The procedure in such

(*Please turn to Page 204*)

Wire Association Elects Officers For 1942-43

Annual Election of Officers held at New York—Program for annual meeting considered—Changes in medal award papers consideration decided upon—Regional meetings authorized for 1942. ✦ ✦ ✦ ✦

AT the Annual Meeting of the Board of Directors of the Wire Association held at the Waldorf-Astoria Hotel, New York, on March 23rd, 1942, the following officers were elected for the 1942-43 term.

President—C. E. Johnson, Supt. Rod & Wire Mills, Bethlehem Steel Company, Sparrows Point, Maryland.

Vice President—Sidney Rolle, Assistant Manager, Scomet Engineering Co., New York, N. Y.

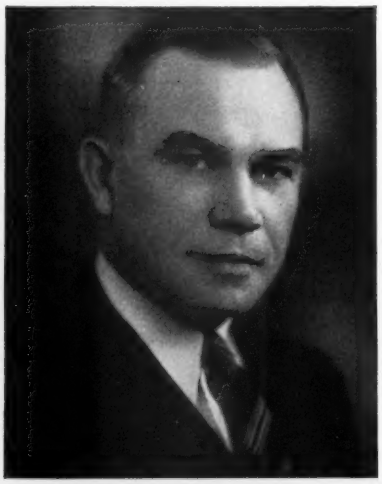
Vice President—D. D. Buchanan, Mgr. of Oprs., Union Drawn Steel Div., Republic Steel Corp., Massillon, Ohio.

Executive Secretary—R. E. Brown, Publisher, WIRE & WIRE PRODUCTS, Stamford, Conn.

✦ ✦ ✦

AMONG the matters considered by the Board were the following:

✦ ✦ ✦



CARL E. JOHNSON
Supt. Rod & Wire Mills,
Bethlehem Steel Company,
Sparrows Point, Maryland
President, The Wire Association

Born Marquette, Mich. Graduate Mining Engineering, Michigan College of Mines (Now Michigan College of Mining and Technology) Houghton, Mich., 1923. While student spent one year working underground and in the open pit mines of the Marquette and Mesabi Iron Ranges. 1923-1925 open hearth department, Bethlehem Steel Company. 1925-1926, Construction Department, Bethlehem Steel Company during construction of wire mill. Upon its completion in 1926 became Assistant Superintendent. In 1927 appointed Superintendent of Rod and Wire Mills.

Regional Meetings

TWO Regional Meetings for 1942 were authorized; one to be held at Worcester, Mass., and one at Pittsburgh, Pa.

✦ ✦ ✦

THE Worcester Meeting will be held at the Bancroft Hotel, Worcester, Mass., on Friday, April 17th, 1942 and will be a dinner meeting starting at 6:30 P. M. The Program will start with the dinner and an after-dinner inspirational speaker from the National Association of Manufacturers.

✦ ✦ ✦

FOLLOWING this there will be a short intermission after which the technical session will open. The speakers at the technical session will be **Harry E. Hartman, Industrial Specialist of the Wire Unit of the War Production Board. Mr. Hartman** has been designated to tell us just where the wire industry is heading in the present situation and his talk will relate to priorities, controls, wire and wire products going directly into defense and defense items, and what the outlook is for the medium size wire mills from the production standpoint in the war effort.

✦ ✦ ✦

FOLLOWING Mr. Hartman's talk, **Mr. Kenneth B. Lewis, Consulting Wire Mill Engineer,** of Worcester, Mass., will deliver one of his famous "off-the-record" speeches.

THE meeting will conclude with the sound motion picture entitled **"Unfinished Rainbows."** This picture will be furnished by the courtesy of the **Aluminum Company of America** and shows the processes of production of aluminum rod, wire and strip.

✦ ✦ ✦

THE committee in charge of the meeting consists of **Mr. George D. Hartley,** Consulting Engineer, Worcester, Mass., **Mr. Rodman R. Tatnall,** Metallurgist, Wickwire Spencer Steel Co., Worcester, Mass., and **Major Richard E. Brown,** Executive Secretary of the Wire Association.

✦ ✦ ✦

Pittsburgh Regional Meeting

THE Pittsburgh Regional Meeting will also be a dinner meeting with an inspirational speaker

(*Please turn to Page 216*)

D. D. BUCHANAN
Manager of Operations,
Union Drawn Steel Div., Republic Steel Corp.

Associated with Union Drawn Steel for past eighteen years. He has served in present capacity as manager of operations since 1939. During period 1930-1939 assistant general manager, and prior to 1930 manager of No. 3 plant at Beaver Falls. He started at Cambria Steel Company, Johnstown, Pa., in open hearth and rolling mills departments. Later he was connected with Jones & Laughlin Steel Company, South Side, Pittsburgh, Pa., and with See-Seldon, industrial engineers, in Pittsburgh.

✦ GOVERNMENT WIRE PRODUCTION INFORMATION ✦

Copper Scrap

AN order has been issued to conserve the supply and direct the distribution of Copper Scrap and Copper Base Alloy Scrap.

✦ ✦ ✦

BRASS Mill Scrap can only be delivered to a Scrap Dealer or a Brass Mill. Other Scrap can only be delivered to a Scrap Dealer (if inventory is in accordance with the Order) or to persons authorized by the Director of Industry Operations. No Scrap Dealer shall melt Scrap, including Scrap on hand, unless authorized by the Director of Industry Operations.

✦ ✦ ✦

Second Hand Machine Tools

IN the interest of National Defense to control the sales and deliveries of Second Hand Machine Tools, until further notice the Director of Industry Operations may, at his discretion, issue an order prohibiting the sale or other disposition of any specific Second Hand Machine Tool. No person to whom such an order is issued may thereafter sell or otherwise dispose of such Machine Tool until he receives directions as to its disposal from the Director of Industry Operations or such other duly authorized official.

Exports and Imports of Wire

AS a wartime measure to prevent vital information being given to the enemy, the Bureau of the Census has suspended publication of the "Monthly Summary of Foreign Commerce of the United States," beginning with the October issue. As soon as this suspension order is rescinded, we will resume publication of Exports and Imports data.

ALL the provisions and definitions contained in Priorities Regulation No. 1 insofar as they are not inconsistent with the Order shall be considered a part of the order.

✦ ✦ ✦

Copper Shoe Findings

IN the interests of National Defense to conserve the supply and direct the distribution of Copper, "Shoe Findings" means eyelets, hooks, tacks, nails, hob nails, screws, spikes, plates, snaps, slide fasteners, rivets, wires, slugs, studs, and other findings for any kind of Shoes.

✦ ✦ ✦

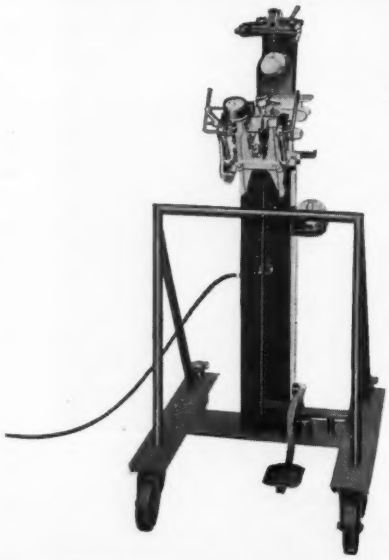
THE Order prohibits the manufacture, delivery, acceptance, or use of Copper Shoe Findings after March 31, 1942, except for Army, Navy, Maritime Commission, Panama Canal, Coast Guard, and Lend-Lease Orders where the

MICROMETER PRECISION MICRO-WELD TRADE MARK REG. U. S. PAT. OFF.

CONTINUOUS IMPROVEMENT

MICRO-WELDERS with dial indicating annealing attachments are now available for high carbon wire.

There is positive control of annealing temperature and already hundreds of these special MICRO-WELDERS are proving their dependability and satisfactory performance with leading manufacturers.



MICRO PRODUCTS COMPANY
20 NORTH WACKER DRIVE, CHICAGO, ILL.
Telephone, State 7468

use of any less scarce material is impracticable. During the period between January 1, and March 31, 1942, the manufacture of Copper Shoe Findings is curtailed and the use of Copper in such Findings is restricted. A limit is also placed on the Copper Shoe Findings inventories of Shoe manufacturers.

✦ ✦ ✦

Steel Warehouse Deliveries Restricted

STEEL Warehouses are prohibited from accepting deliveries of steel in excess of their assigned quotas from any person or company by the terms of Amendment No. 3 to Supplementary Order M-21-b issued by the Director of Industry Operations.

✦ ✦ ✦

THE restrictions previously imposed by the order applied only to deliveries from steel producers. The chief purpose of this amendment is to prevent the warehouses from obtaining deliveries of products listed in Schedule A of the order in excess of quotas from other sources such as automobile companies which may have steel for sale at the present time.

✦ ✦ ✦

THE order has also been amended to permit warehouses to accumulate preference ratings higher than A-9 on deliveries to their customers up to a period of 90 days so that they may place with their suppliers an order for a minimum commercial quantity. However, any steel obtained by a warehouse through extension of a rating higher than A-2 may not be delivered by the warehouse to any customer except on orders which bear a rating higher than A-2 until such stock has been held for at least 90 days.

✦ ✦ ✦

PARAGRAPH "d" of the order has been amended to restrict deliveries from warehouses of certain types of steel and steel products to orders bearing high preference ratings. This paragraph applies especially to the delivery of steel plates.

✦ ✦ ✦

ANOTHER amendment to the order, contained in paragraph

(*Please turn to Page 198*)

Wired for Handling Essential Fruits

Berrien County Baskets

Equipped with KEYSTONE *Wire* HANDLES

You've probably purchased some of the widely-distributed fancy fruits grown in Southwestern Michigan. If so, you may have noticed the stamp "Berrien County Package Co., Benton Harbor, Michigan" on the side of a neat, sturdy basket. For the products of this concern (approximately 8,000,000 packages a year) play a major part in harvesting and marketing the important fruit crop of this section.

And important to these products are the handles and staples made from Keystone wire. The Berrien County Package Company states: "Keystone wire has proved very satisfactory in our manufacturing operations. We have used it exclusively for several years."

KEYSTONE

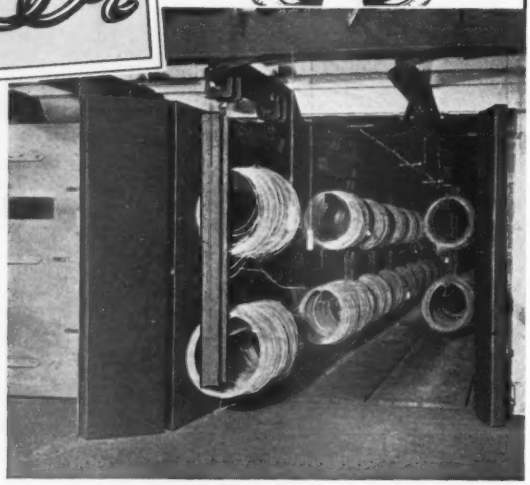
STEEL & WIRE CO. Dept. W PEORIA, ILLINOIS

HIGH CARBON OR LOW CARBON

SAMSON REG. U.S. PAT. OFF. SPRING WIRE KEYSTONE STEEL & WIRE CO. PEORIA, ILL.

Bright-Tinned Coppered Annealed Galvanized

It's the new ROSS Wire Baker



..that shortens the baking cycle

A modern "must" for Wire and Rod Mills that need increased production and improved quality of product. The Ross Baker circulates high temperature air, clean and free from all products of combustion, to greatly speed up drying. Troublesome rusting and irregular lime coating are eliminated—quality is improved. Air Heaters use any oil or gas fuel available.

Ask Us About Revamping Your Present Equipment

Before recommending a new baker our engineers will determine whether your present unit can be revamped. Write our nearest office.

J. O. ROSS ENGINEERING CORPORATION

Main Office—350 MADISON AVENUE., New York, N. Y.

CHICAGO—201 North Wells Street DETROIT—12953 Greeley Avenue

ROSS ENGINEERING OF CANADA, LIMITED, Dominion Square Building, Montreal

Government Wire Production Information

(*Continued from Page 197*)

"c," enables small warehouses to buy steel products listed in Schedule "B" in minimum carload lots, notwithstanding the restrictions on quarterly deliveries, provided the warehouse does not accept deliveries in excess of its total annual quota.

✦ ✦ ✦

WIRE rope has been omitted from the schedules of products to which quotas may be assigned under the terms of the order.

✦ ✦ ✦

Manufactured Products Discontinuance Will Affect Wire Industry Radios

THE War Production Board has ordered the manufacture of radios and phonographs for civilian use to be discontinued after April 22, 1942.

✦ ✦ ✦

THE plants may complete sets on which they begin assembly work on or before April 22, 1942, under the limited production quotas provided for in the original order (L-44). They may also continue to make replacement parts.

✦ ✦ ✦

OTHER than that the entire facilities of the American radio industry will be made available for war production.

✦ ✦ ✦

ONE order (L-44-a) affects 55 companies manufacturing home receiving sets who in 1941 employed approximately 30,000 persons, produced more than 13,000,000 sets, and did a business of approximately $240,000,000. In the manufacture of these more than 13,000,000 sets for civilian use the following amounts of critical materials were used: 2100 tons of aluminum, 10,500 tons of copper, 280 tons of nickel, and 70,000 tons of steel.

✦ ✦ ✦

WAR equipment to be produced by the radio industry will include airplane detection equipment, to detect approaching enemy aircraft, and transmitting and receiving equipment to enable our

armed forces—on land, on sea, or in the air—to communicate with each other.

✦ ✦ ✦

MILITARY orders already placed for war radio equipment amount to more than one billion dollars. Orders of approximately $500,000,000 are held by the 55 companies affected by today's order; the balance are held by companies not usually engaged in the manufacture of home radio sets.

✦ ✦ ✦

THE provision in the order for the continued manufacture of replacement parts will enable the bulk of the existing home radios to be kept in efficient operating condition during the war.

✦ ✦ ✦

Incandescent Light Bulbs

REDUCTION of the number of sizes of incandescent light bulbs to save critical materials has been discussed at a meeting of the Incandescent and Fluorescent Lamp Industry Advisory Committee.

✦ ✦ ✦

THERE are now some 2500 different sizes of different types of incandescent bulbs, for home and store lighting, for flashlights, for radio and automobile panels for advertising signs, etc. Each bulb contains critical war materials—copper, brass, nickel, and tungsten. The larger the number of sizes, the larger the inventory required by manufacturers, wholesalers, and retailers; and the larger the inventory, the greater the amount of critical materials either used or tied up in light bulbs.

✦ ✦ ✦

AT the meeting is was suggested that the number of sizes might be reduced to approximately 1000.

✦ ✦ ✦

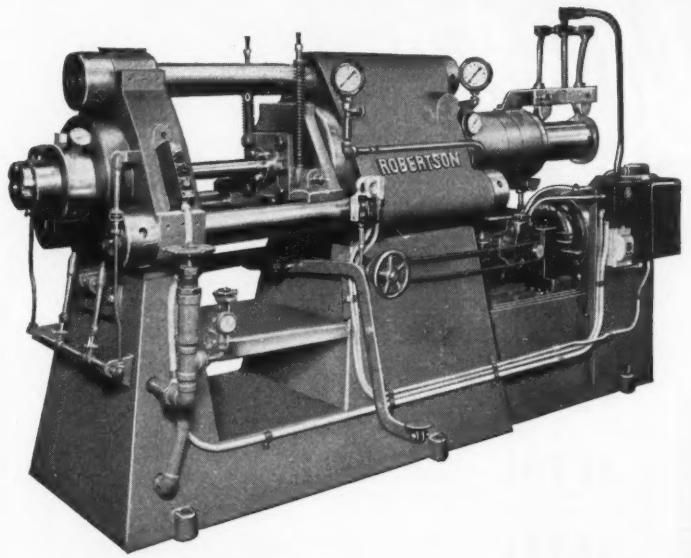
IT was also suggested that the number of voltages might be reduced. Bulbs are now manufactured for 105, 110, 115, 120, 125, 130 and 135 volts. It was suggested that 110, 115, and 125 volts would serve the same purpose.

✦ ✦ ✦

MEMBERS of the Incandescent and Fluorescent Lamp In-

Uncanny Simplicity WITH Speed and Accuracy

ROBERTSON *Improved*
horizontal extrusion press



FINGER TIP CONTROL...

. . . sends the press forward through the extrusion stroke and returns it to starting position . . . with no other attention.

The modern means for extruding miscellaneous non-ferrous alloys, lead and its alloys, solder and solder wire and flux core solder wire.

Write for details—and, our engineers are always at your service.

JOHN ROBERTSON CO., INC.
125-137 WATER ST., BROOKLYN, N.Y.

Government Wire Production Information

(*Continued from Page 199*)

dustry were announced today by the Bureau of Industry Advisory Committees. Louis C. Upton, Chief of the Consumers Durable Goods Branch of the WPB, is Government Presiding Officer. Committee members are:

Mr. Leonard Grossman, President
Jewel Incandescent Lamp Co.
East Newark, New Jersey

Mr. E. S. Kirby, President
Save Electric Corporation
Toledo, Ohio
Mr. F. N. Bishop, Manager
Parts Dept., Lamp Division
General Electric Co.
Cleveland, Ohio
Mr. H. G. Cheney
Westinghouse Mfg. Co.
Bloomfield, New Jersey
Mr. C. P. Boggs, Asst. to Exec. V. P.
Hygrade Sylvania Corporation
Salem, Massachusetts
Mr. F. A. Vosburgh, Jr., President
Carlton Electric Lamp Company
Brooklyn, New York
Mr. R. E. Carlson, Vice President
Tung-Sol Lamp Works
Newark, New Jersey
Mr. A. M. Parker, President
Wabash Appliance Corporation
Brooklyn, New York

PROTECT *Wire* PRODUCTS WITH JETAL

THE PATENTED BLACK OXIDE FINISH FOR IRON AND STEEL

Follow the trend to the JETAL black finish! Will not chip, scale or peel.

JETAL can be substituted for nickel, zinc, cadmium and tin plating.

JETAL assures 100% increase in production. Requires no skill, no elaborate equipment, no electrical current.

JETAL gives from 50% to 70% more abrasion and wear resistance — as high as 230%, by changes in procedure.

JETAL with proper protective oils or lacquers, offers high salt spray resistance.

JETAL saves you 30% in price . . . and goes farther.

JETAL as a base for lacquers, enamels and japan shows superior salt spray resistance, improved bonding and prevents spreading of corrosion under the film.

the JETAL process

Immediate delivery—any quantity. Send samples for JETALizing without charge. Consultation service without obligation.

Alrose Chemical Company
Providence, R. I. **Tel. Williams 3000**

Copper Mining Output

A PROGRAM to increase output in the copper mining industry by continuous operation on a seven-day week basis was announced recently by **Sidney Hillman,** Labor Director of the War Production Board.

✦ ✦ ✦

"THE labor organizations involved have offered full cooperation in this program which would increase worker efficiency by improving job conditions in the mines, and by establishing joint labor-management production committees," Mr. Hillman said.

✦ ✦ ✦

"AN adequate supply of copper is crucial to effective prosecution of the war," he added. "The whole copper mining problem has been one of the most complex and difficult faced by the government. This program should do much to solve it."

✦ ✦ ✦

HIGHLIGHTS of the program, which closely followed the proposals of the International Union of Mine, Mill and Smelter Workers, are:

I. Improved Working Conditions
2. Labor-Management Advisory Committees
3. Seven Day Week

✦ ✦ ✦

Manganese Production Program From Low-Grade Domestic Ores

A VAST manganese production program from low-grade domestic ores has been announced by William L. Batt, Director of Materials.

✦ ✦ ✦

SEVEN small projects and three large ones have been recommended for Federal financing to produce this vital steel alloy.

✦ ✦ ✦

THE importance of manganese is readily apparent in the fact that an average of 14 pounds of it are essential in the production of a long ton of steel.

✦ ✦ ✦

THE new plants, plus those already in operation, should produce well over 600,000 tons a

year in high grade manganese concentrates, as compared with 30,000 tons domestically produced in 1939 and 40,000 tons in 1940.

✦ ✦ ✦

MEANTIME, the United States has a sizeable manganese stockpile, which, with domestic production and imports from Cuba, will enable steel production to go forward without interruption until the new manganese mills are completed. Some of these will take only a few months and others more than a year, but all are expected to get into production in 1943.

✦ ✦ ✦

THE manganese program, Mr. Batt pointed out, is one of insurance rather than immediate and pressing necessity. In addition to the reserve supply now in this country, shipments still are being received from abroad and considerable quantities are coming from South America.

U. S. Tin Smelter Being Rushed To Completion

THE United States tin smelter now under construction in Texas will be rushed to completion with the assistance of an A-1-a rating for materials, it was recently announced by J. S. Knowlson, Director of Industry Operations.

✦ ✦ ✦

THE plant, which was started as an 18,000-ton smelter, has been increased to 52,000 tons capacity and may be increased further. It will process Bolivan tin ore, as well as concentrates from Malaya and the Netherlands Indies received since the outbreak of hostilities in the Pacific.

✦ ✦ ✦

WHILE Bolivian ore is not expected in sufficient volume to keep the smelter in full operation over a long period it has a large supply of ore on hand and any further reshuffling of military forces around the world may result in concentrates from other areas reaching this country.

✦ ✦ ✦

Auto Graveyards to Receive Purchase Offers

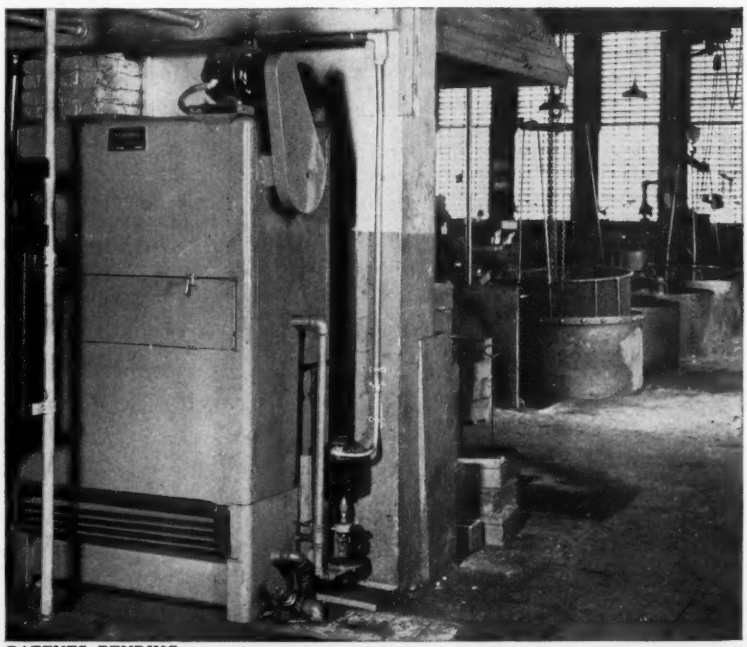
DEFINITE offers will be made within 90 days for the purchase of all cars in the country's automobile graveyards that are located within reasonable distance of metal consumers, according to an announcement made today by the Bureau of Industrial Conservation of the War Production Board.

✦ ✦ ✦

EACH of the approximately 80 companies operating steel-making furnaces and foundries, as well as other large users of iron and steel scrap, are being or will be asked by the War Production Board to appoint one man to be responsible for that company's participation in the graveyard program. His job will be to see that the dealers through whom his company normally buys scrap will,

(*Please turn to Page 202*)

CONTROLLED TEMPERATURE QUENCHING



PATENTS PENDING

Improves Physical Properties of Steel and Increases Production

Manufacturers of heat-treated steel parts have found that in substituting carbon for alloy steel it has been possible to regain high physical properties and avoid rejections by carefully controlling the quenching temperature.

The quenching bath temperature is accurately controlled by the NIAGARA HEAT EXCHANGER which also adds to cooling capacity while saving water consumption. This has given increased production of heat treated parts.

Write for information based on user's experience with heat-treating, wire drawing, strip steel rolling, lubricating oils, hydraulic fluids, jacket water and other industrial liquids for years of successful use.

NIAGARA BLOWER COMPANY
Dept. WP-42
6 E. 45th Street New York City
37 W. Van Buren St., Chicago, Ill.
Fourth & Cherry Bldg., Seattle, Wash.
673 Ontario St., Buffalo, N. Y.
SALES ENGINEERS IN PRINCIPAL CITIES

NIAGARA *INDUSTRIAL* COOLING • HEATING • DRYING
HUMIDIFYING • AIR ENGINEERING *EQUIPMENT*

Government Wire Production Information

(*Continued from Page 201*)

as agents for the company, make offers for the purchase of the contents of all auto graveyards within economical shipping distance of the company's plants. The plan was submitted to and approved as to feasibility by the Scrap Sub-Committee of the Iron and Steel Industry Advisory Committee at a recent meeting.

TO see that all of the graveyards are covered by the program, the steel companies, as the largest consumers of scrap, are being asked to appoint regional representatives for each of the fifteen regions into which the country has been divided. Their functions will be to act in a liaison capacity with the field agents of the Bureau of Industrial Conservation, to make sure that dealers, brokers and others are making offers for the graveyards within their territory, and to give the fullest publicity to the fact that all graveyards are needed for war production. These regional representatives have been described as focusing points to get the work done in the various regions.

✦ ✦ ✦

THE scrap iron and steel which will be moved into normal channels of trade through this effort will be subject to allocation among scrap-consuming companies. This will mean that, even though a dealer may acquire the cars in a particular graveyard as agent for one company, the scrap metal may be given to another company whose need is greater or whose part in war production is more important. All such allocations will be made by the Iron and Steel Section of the War Production Board.

✦ ✦ ✦

A NATURAL by-product of this campaign will be to make available to consumers a supply of non-ferrous metals such as aluminum, copper, brass, and zinc, which are present in smaller quantities in graveyard cars.

✦ ✦ ✦

Steel Wire Needed for Tanks Flown to England to Maintain Full Production There

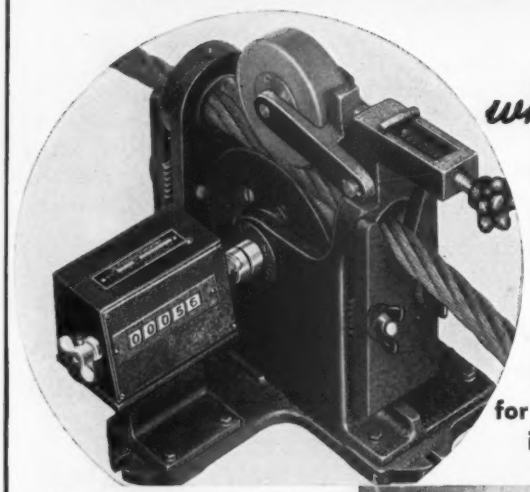
THE American Iron & Steel Institute, in its February 1942 issue of "Steel for Victory" stated that:

✦ ✦ ✦

WHEN German submarines torpedoed a Britain bound freighter some months ago, one of the items of cargo lost was a few tons of a special grade of steel wire used to make ball bearings. The wire was to have made bearings for British tanks. When the loss came to light, only four days remained before the English bearing manufacturer had to have the steel in order that the bearings would be available on the assembly line where the tanks were being produced. English steel mills were

(*Please turn to Page 212*)

PRODUCTIMETERS *have what it takes*

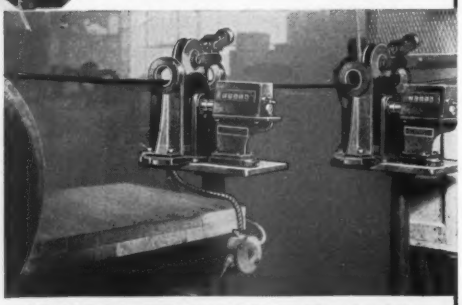


Speed . . .
Accuracy . . .
Sturdy construction
Adaptability
Dependability
for measuring Production in the Wire Industry

Wire Measuring Unit L-20

That is why they are in constant use in many important plants throughout the country, making materials to win the Victory.

The Productimeter line of Wire Measuring Machines is complete. Speeds range from 600 to 5000 counts per minute . . . capacities from .01" to 3½" diameter. They are built to meet today's emergency.



Cable Measuring Installation showing two Heavy-Duty L-20 Wire Measuring Units: one for short predetermined runs, the other a totalizer to register continuous production.

If you are using old-fashioned, near-accurate methods of measuring production, you have a slowing-up problem to meet. To overcome it, *Victory-line* your machines with Productimeters, eliminate waste, save valuable time in which to produce more.

Wire Measuring Catalog No. 3 sent on request.

DURANT MANUFACTURING COMPANY

1918 N. Buffum St., Milwaukee, Wis. 176 Eddy St., Providence, R. I.

PRODUCTIMETERS
THE SPEEDOMETERS OF INDUSTRY

A Study of the Effect of Core Wire Temper on the Quality Of Welds in Nickel, Monel And Inconel

(*Continued from Page 193*)

min. was used up to about 40,000 to 45,000 psi, and a speed of 0.20 in. per min. thereafter till fracture. Elongation measurements were taken so as to include both the weld and the fracture.

✦ ✦ ✦

THE tensile test coupons were machined into standard long- and short-gage tensile test specimens, 1 in. wide in the reduced section and about 0.23 in. thick. The bend specimens were approximately 1½ in. wide and about 0.23 in. thick.

✦ ✦ ✦

IN machining, the back-up strip was removed by milling, the excess weld metal of the surface bead dressed flush to the plate and a light over-all cut taken on both surfaces. The weld cross section and the plate cross section were therefore identical.

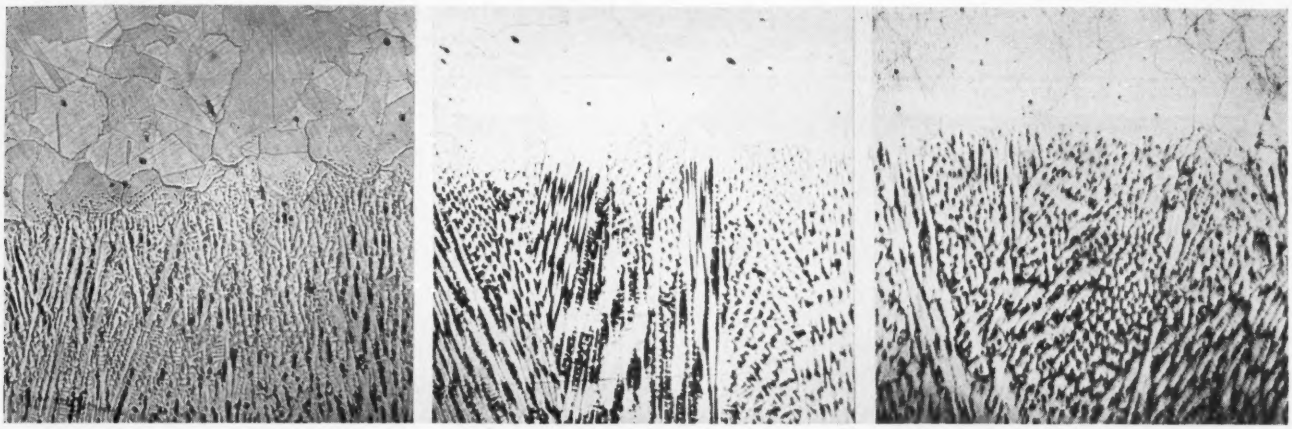
Testing Procedure

IN the tensile tests, a speed of 0.067 in. per min. was used up to about 40,000 to 45,000 phi, and a speed of 0.20 in. per min. thereafter till fracture. Elongation measurements were taken so as to include both the weld and the fracture.

✦ ✦ ✦

THE bend tests were carried out in the usual way, using the Navy jig, the radius of bend being ¾ in.

(*Please turn to Page 204*)

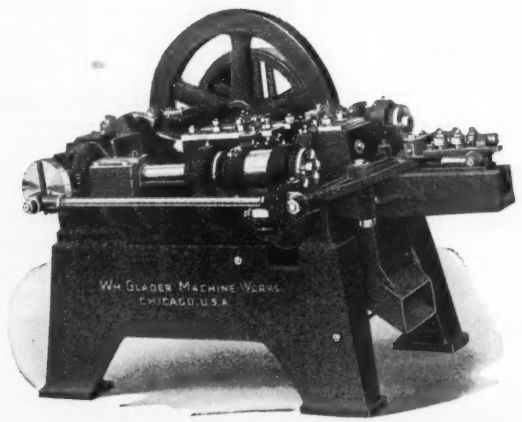


Monel Nickel Inconel

Fig. 3. Microstructure (100X) of Welds in Fig. 2. The Weld Structure Is in th e Lower Half of Each Cross Section.

✦ ✦ ✦ ✦

GLADER WIRE NAIL MACHINE SCORES AGAIN



WM. GLADER MACHINE WORKS

210 N. Racine Ave. Chicago, Illinois

A new Wire Mill under construction in the State of Texas will install GLADER WIRE NAIL machines 100%.

The production figures on common nails shown below, are guaranteed.

SIZE MACH.	SIZE WIRE	MAX. LENGTH OF WIRE	NUMBER OF NAILS PER MIN.	CAP. IN POUNDS PER HR.
#00A	#16	1⅛"	700	37.2
#00	#14	1¼"	550	55
#0	#12	1¾"	450	89
#1	#10	2½"	400	192
#2	#8	3½"	325	310
#3	#4	5"	225	523
#4	#1	7"	190	622
#4s	5/16"	9"	175	1155
#5	⅜"	12"	160	2400

This high output and economical operation account for the GLADER machine being accepted as standard equipment in all recent installations.

A Study of the Effect of Core Wire Temper on the Quality Of Welds in Nickel, Monel and Inconel

(*Continued from Page 203*)

Results of Mechanical Tests

THE results of the long and short gage tensile tests and the bend tests are tabulated in Table 6. Briefly, the tests indicate that the mechanical properties of the welded joints were not affected by the temper of the nickel, Monel or Inconel core wire.

Macro and Micro-examination

FIGURE 2 shows the macrostructure of the nickel, Monel and Inconel welds made with 15 per cent cold reduction core wire electrode while Fig. 3 shows the microstructure of these welds at 100 magnification.

✦ ✦ ✦

Conclusions

1. THE temper of the electrode wire had no discernible effect on the mechanical properties of nickel, Monel or Inconel electric arc welds.

2. THE temper of the electrode wire had no important effect on the arcing characteristics of the electrode.

✦ ✦ ✦

The Supervision of Maintenance Costs

(*Continued from Page 194*)

instances is almost identical, the engineers requisitioning from stores and the stores passing the relative requisition to the office for dissecting and posting.

✦ ✦ ✦

Cost of Work

THE total cost of executing work is not arrived at by the simple addition of raw material costs to the actual remuneration. A further addition must necessarily be made to the resultant total of these two items in order to effect a coverage for the various charges of an indirect nature which are always associated with the engineering section. These indirect additions will vary from factory to factory but, taken all 'round, it will be found that the following constitute those generally applicable:—

1. **Remuneration to the executive engineers.**
2. **Rent, rates and insurance directly attributable to the engineering section.**
3. **Power costs.**
4. **Depreciation costs of engineering plant and equipment.**

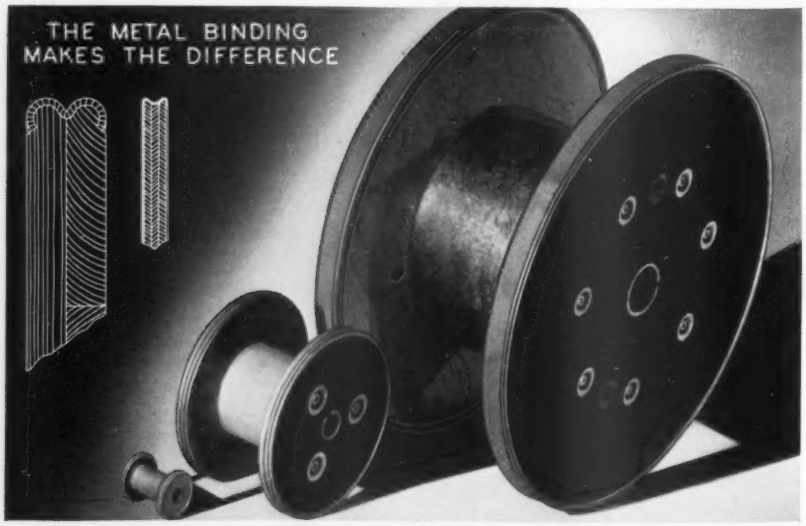
✦ ✦ ✦

EXPENSES under these headings are normally summarized annually and are then capable of expression as a percentage value of the actual operating engineers' wages. It is in such a manner that absorbtion over the total engineering wages is arranged.

✦ ✦ ✦

Capital Work

THE acquisition of new plant may be followed by installation by the seller's staff, but on the other hand the resident engineers may be fully capable of carrying out the work at reduced expense for by so doing they eliminate the profit allowance which



Serve Yourself and Your Customers **BETTER**

With HUBBARD Metal Bound Shipping Spools and Reels

With wood for lightness combined by a patented process with steel for strength, Hubbard spools and reels have the stamina to withstand the roughest handling. Where breaking, warping, and splintering might occur, there the die formed steel protects the wood.

Such construction means long run economy. You'll be buying spools and reels less often. Both you and your customers will be guarded against needless breakage losses. You'll find that employees like to work with Hubbard spools and reels, since there are no jagged rough edges to cut hands and tear clothing.

Serve yourself and your customers better by switching to these true running, stronger carriers for all types of wire. They are modern in design and moderate in price. Write for full details.

HUBBARD SPOOL COMPANY

1624 CARROLL AVENUE | CHICAGO, ILLINOIS

Since 1912, manufacturers of wire drawing and annealing, and shipping spools and reels.

PRODUCTION FOR SALE OF IRON AND STEEL PRODUCTS -- JANUARY, 1942

AMERICAN IRON AND STEEL INSTITUTE
Capacity and Production for Sale of Iron and Steel Products

January - 1942
PERIOD

	Number of companies	Items	Annual Capacity Net tons (a)	Production for Sale—Net Tons							
				Current Month				Year to Date			
				Total	Per cent of capacity	Shipments		Total	Per Cent of capacity	Shipments	
						Export *	To members of the industry for conversion into further finished products			Export	To members of the industry for conversion into further finished products
Wire rods	20	25	xxxxxxxx	110,354	xxx	.....	17,590	.....	xxx	.....	.....
Wire—Drawn	43	26	2,348,690	200,987	100.7	.....	3,705	.....	.....	.....	.....
Nails and staples	19	27	1,157,650	61,478	62.5	.....	xxxxxxxx	.....	.....	.....	xxxxxxxx
Barbed and twisted	15	28	469,810	26,666	66.8	.....	xxxxxxxx	.....	.....	.....	xxxxxxxx
Woven wire fence	16	29	774,785	20,100	30.5	.....	xxxxxxxx	.....	.....	.....	xxxxxxxx
Bale ties	11	30	120,930	5,480	53.3	.....	xxxxxxxx	.....	.....	.....	xxxxxxxx
All other wire products	9	31	71,020	3,103	51.4	.....	xxxxxxxx	.....	.....	.....	xxxxxxxx
Fence posts	11	32	107,160	3,020	33.2	.....	xxxxxxxx	.....	.....	.....	xxxxxxxx

The Supervision of Maintenance Costs

(*Continued from Page 204*)

the seller must include in respect of delivery and erection.

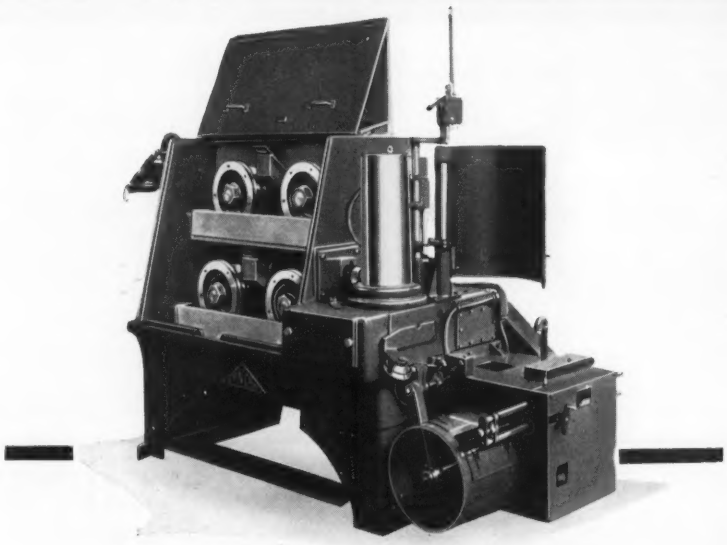
✦ ✦ ✦

CAPITAL work of all types must be regarded as entirely segregated from the normal maintenance and repair activities of the engineering staffs. To the outlay for capital work, the remuneration paid for plant installation, etc. must be added, the total ranking for subsequent depreciation allowances. It is not so unusual for comparison to be drawn between the cost of capital outlay on plant acquisition and installation by the vendor and the capital outlay on plant with domestic installation by the resident employees. Such comparisons will normally show a profit which is then credited to the engineering department. Regular compilation of an account especially opened and maintained for capital work, will demonstrate the profit or loss which the engineers have made.

✦ ✦ ✦

Union Wire Rope Expansion

THE **Union Wire Rope Corporation** of Kansas City, Mo., at the present time has eight buildings under construction, including an oven cleaning house, another patenting furnace, 10 galvanizing outfits and 20 wire drawing machines.



Continuous *Wet* Drawing of Low and High Carbon *Steel* Wire with the Syncro BCS-14 Machine

Equipped with 14 dies and 4 draw block shafts, the Syncro BCS-14 Machine wet draws low and high carbon steel wire at high speeds. The maximum entering size for this machine is #13 W & M gauge.

Extremely flexible, this machine is equipped with a coiler and a spooler, and the changeover from one to the other is easily and quickly effected.

The coiler block can be arranged to produce either right or left hand winding. The unusual heighth of the block permits production of heavier coils, which reduces shut-downs and operator attention.

The spooler is of most modern design, producing clean and excellently wound wire. Change gears permit variation of finishing speed—and split gauge sizes can be finished.

Similar equipment is available for all non-ferrous metals.

Requiring only 80 square feet of floor space, the Syncro BCS-14 Machine offers you many advantages. Write for complete details.

Syncro Machine Company

Rahway, New Jersey — McCormick Bldg, Chicago

Represented in Canada by Canadian Elevator Equipment Co., Ltd., Toronto

A Review of Recent Wire Patents

No. 2,271,706, PROCESS FOR COATING METAL SURFACES, patented February 3, 1942 by William C. Morris, North Chicago, Ill., a corporation of Delaware.

To the metal surface is applied a bond coat containing an acid solution of antimony trichloride and arsenic trichloride, and stannous chloride.

✦ ✦ ✦

No. 2,271,986, WIRE COATING DIE, patented February 3, 1942 by Robert W. Mungall, Schenectady, N. Y., assignor to General Electric Company, a corporation of New York.

An expansible die assembly for use in coating rectangular wire is provided comprising two pairs of oppositely disposed die members defining a die opening adapted to receive a wire to be coated, one of these pairs having transversely extending recesses in each, the other of the pairs having tongues projecting therefrom adapted to slide in the recesses.

✦ ✦ ✦

No. 2,272,187, WIRE DRAWING MACHINE, patented February 10, 1942 by Frank P. Dahlstrom, Woodbridge, Conn., assignor to The Aetna-Standard Engineering Company, Youngstown, Ohio, a corporation of Ohio.

The blocks are adapted to carry a reserve of wire and means is provided for withdrawing the wire from at least one of the blocks in an axial direction including a guide for the wire rotatable about an axis substantially coaxial with the block, the combination of friction means tending to rotate the guide in the direction of rotation of the block, the tension of the wire against the guide tending to rotate the guide in the opposite direction.

Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 300 Main St., Stamford, Conn.

✦ ✦ ✦

No. 2,272,192, WIRE DRAWING MACHINE, patented February 10, 1942 by Edward J. P. Fisher, North Jackson, Ohio, assignor to The Aetna-Standard Engineering Company, Youngstown, Ohio, a corporation of Ohio.

Variable speed means for driving the block is provided, as well as means for withdrawing the wire from the block in an axial direction, a guide mounted for rotation about an axis coaxial with the block for guiding the wire withdrawn therefrom, a gear rotatable with the guide, and control means operatively and positively connected to this gear for promptly controlling the speed of the block in response to movements of the guide.

✦ ✦ ✦

No. 2,272,195, WIRE DRAWING MACHINE, patented February 10, 1942, by Jerome R. George, Marion, and Kenneth B. Lewis, Worcester, Mass., assignors to The Aetna-Standard Engineering Company, Youngstown, Ohio, a corporation of Ohio.

There is provided separate control means for each block for adjusting the speed of each block without stopping the blocks independently of the speed of every other block so that the relationship between the rate at which wire is being drawn onto any block and the rate at which it is being withdrawn from the block is at all times under the control of the operator whereby the amount of accumulation and time of cooling on each drum may be accurately controlled by the operator.

✦ ✦ ✦

No. 2,272,807, UPHOLSTERY CONSTRUCTION, patented February 10, 1942 by Jacob Kronheim, Cleveland Heights, Ohio, assignor to John C. Lincoln, Scottsdale, Ariz.

A corrugated spring is provided having its ends extending through the webbing and one end carried by a bracket, the spring being provided with an integral upwardly extended suspension means at its other end including an attachment end portion inclined with respect to the suspension means, the combined length of the bracket and spring member being less than the width of the frame for effecting longitudinal stretching and bending stresses in the spring member when the attachment portion of the sus-

THE WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON, NEW JERSEY, U. S. A.

ELECTRICAL WIRE AND CABLE AND WIRE ROPE MACHINERY

Stranders
Bunchers
Cablers
Closers
Armor. Machines
Tapers
Juters
Serving Heads
Compound Tanks
Saturating Tanks
Powderers and Chalkers
Capstan Sections

Let-offs
Gang-Spoolers
Re-winders
Capstan Takeups
Continuous Takeups
Heavy-Duty Takeups
Traverses
Measuring Mach's.
Testing Mach's.
Vulcanizers
Polishers
Reel Crutches

MEAS. MACH'S. TRAVERSES, REEL CRUTCHES, BUNCHERS, SMALL POWDERERS, ETC. — USUALLY CARRIED IN STOCK

LITERATURE AVAILABLE ON ALL LISTED UNITS

pension means is drawn toward and secured to the frame.

✦ ✦ ✦

No. 2,273,064, SPRING UNIT FOR MATTRESSES, patented February 17, 1942 by David T. Owen, Cleveland Heights, Ohio, assignor to Hanna G. Dimick, Cuyahoga Falls, Ohio.

Coil springs for inner spring mattresses are provided with special means for the protection of the covering.

✦ ✦ ✦

No. 2,273,234, METHOD OF AND SOLUTION FOR PRODUCING A COATED IRON ARTICLE, patented February 17, 1942 by Robert R. Tanner, Highland Park, Michigan, assignor, by mesne assignments, to Parker Rust-Proof Company.

The process comprises exposing a surface of the article to the action of an aqueous solution containing a substantial amount of ferric oxalate until the desired thickness of coating is obtained.

✦ ✦ ✦

No. 2,273,483, WIRE SCREEN CLOTH, patented February 17, 1942 by William L. Fink, Aspinwall, Pa., and William T. Ennor, Massena, N. Y., assignors to Aluminum Company of America, Pittsburgh, Pa., a corporation of Pennsylvania.

A screen cloth strand is provided comprising a duplex wire having a core of an alloy containing from 4 to 6 per cent magnesium, the balance being substantially aluminum, this core having a coating thereon of an alloy containing from 0.5 to 3 per cent zinc, 0.5 to 2 per cent magnesium, 0.25 to 1.25 per cent silicon, and a hardening element from the group consisting of chromium 0.1 to 0.5 per cent and manganese 0.1 to 1 per cent, the balance being substantially aluminum.

✦ ✦ ✦

No. 2,273,518, METHOD OF INSULATING ELECTRICAL CONDUCTORS, patented February 17, 1942 by Walter E. Gloor, Milltown, N. Y., assignor to Hercules Powder Company, Wilmington, Del., a corporation of Delaware.

The invention consists in subjecting the conductor to immersion in a heat-stable, molten composition consisting essentially of ethyl cellulose and pine wood resin distinguished by substantial insolubility in petroleum hydrocarbons, solubility in alcohol, and by a methoxyl content of between about 3% and about 6% until the conductor is protected and insulated by the composition.

✦ ✦ ✦

No. 2,273,589, METHOD OF MAKING POROUS METAL BODIES, patented February 17, 1942 by Richard G. Olt, Dayton, Ohio, assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware.

In this method, there is provided metal powder having at least two metallic constituents of different melting points, particles of the powder including a constituent rich surface thereon, the constituent being the lowest melting constituent and then sintering the powder in the loose non-compacted condition and in desired shape under suitable conditions at a temperature above the melting point of the constituent rich surface metal and below the melting point of the highest melting constituent metal for a time sufficient to cause at least partial alloying of the lower melting constituent with the other constituent whereby the powder is bonded together in an alloy bond without excessive shrinkage.

No. 2,273,731, STAINLESS STEEL CONTAINING BISMUTH, patented February 17, 1942 by Robert S. Peoples and Henry A. Holden Pray, Columbus, Ohio, assignors to Alloy Casting Institute, of New York, an unincorporated association of New York.

This alloy contains between 15% and 30% chromium, and having improved machinability due to the presence of bismuth therein, the alloy containing from .02 to 1.0 per cent bismuth.

✦ ✦ ✦

No. 2,274,031, INSULATED ELECTRICAL CONDUCTOR, patented February 24, 1942 by Lewis A. Bannon, Roselle, N. J., assignor to Standard Oil Development Company, a corporation of Delaware.

About the wire conductor is a sheath and an insulator member surrounding the conductor within the sheath consisting of a solid insulating member and a submerging insulating oily olefinic polymer produced by polymerization of an isobutylene dimer characterized by fluidity, by a low pour point below about 0°F., by freedom from wax, by a high penetrating and spreading power, by a molecular weight between the limits of approximately 300 and 5,000 and a viscosity index below approximately 0.

✦ ✦ ✦

No. 2,274,036, WIRE STRAIGHTENING DEVICE, patented February 24, 1942 by William H. Buck, Buffalo, N. Y.,

(Please turn to Page 220)

WIRE ASSOCIATION
WORCESTER REGIONAL MEETING

Will Be Held At The

Hotel Bancroft, Worcester, Mass.

Friday, April 17th, 1942 — 6:00 P. M.

—— PROGRAM ——

Dinner — 6:30 P. M. — Hotel Bancroft

Speaker From National Association of Manufacturers

— Intermission —

Technical Session Speakers

Harry E. Hartman, Industrial Specialist,
Wire Unit, War Production Board, Washington, D. C.

Kenneth B. Lewis, Consulting Wire Mill Engineer,
Worcester, Mass.

✦ ✦ ✦

Technicolor Motion Picture — "Unfinished Rainbows"
Courtesy — The Aluminum Company of America.

✦ ✦ ✦

Registration Fee — Including Dinner — $2.50

Please Make Early Reservation To

RICHARD E. BROWN

300 Main Street Stamford, Conn.

COMMITTEE-IN-CHARGE OF ARRANGEMENTS

George B. Hartley, Consulting Engineer, Worcester, Mass.

Kenneth B. Lewis, Consulting Engineer, Worcester, Mass.

Rodman R. Tatnall, Wickwire Spencer Steel Co., Worcester, Mass.

Richard E. Brown, "Wire & Wire Products" Stamford, Conn.

Outstanding Personalities of the Wire Industry

Industrial Products Sales Division Set-Up by B. F. Goodrich Company

THE former mechanical goods and sundries sales divisions of The B. F. Goodrich Company, Akron, Ohio, have been combined and given a new name, the Industrial Products Sales Division, it is announced by **W. S. Richardson,** division general manager.

✦ ✦ ✦

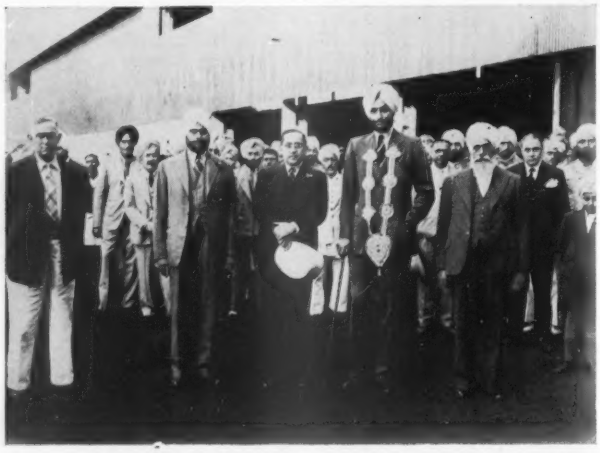
THE organization set-up under the new policy is as follows:

✦ ✦ ✦

B. F. STAUFFER, division assistant general manager in charge of Miller plant activities; **L. H. Chenoweth,** manager, manufacturers' sales; **C. F. Conner,** manager, distributor sales; **C. O. Delong,** manager, operations, and the following department managers:

✦ ✦ ✦

P. W. VAN ORDEN, hose and belting; **J. F. Johnston,** molded, extruded, sponge, Anode dipped goods; **G. K. Ryan,** rubber and latex thread, golf ball products; **H. C. Klein,** rubber lined and covered equipment; **F. A. Lang,** shoe products sales; **J. M. Failey,** printing rubber, printing rolls, printing blankets, platens, packings, floor coverings, lathe cut goods; **H. A. Bauman,** bands, drug, hospital and surgical products.



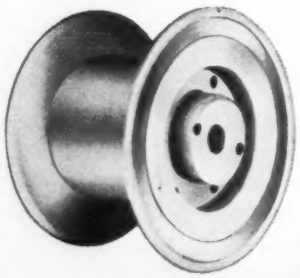
Scene at Indian Steel & Wire Products, Ltd., Tatanagar, B.N.R., India, on the occasion of the visit of the Maharajah of Patiala. The central figure is the Maharajah. The other gentleman in the foreground is Indra Singh Bahadur, proprietor, and head of Indra Singh and Sons who own and manage many other properties and take a leading part in the industrialization of India. General Superintendent Jack Breining needs no introduction to readers of WIRE & WIRE PRODUCTS. ✦ ✦

✦ ✦ ✦

Jones & Laughlin Steel Corp. Announces Personnel Changes

CHANGES involving its District Sales Offices in Cleveland, Ohio, Buffalo, New York, St. Louis, Mo., Toledo, Ohio, and its export Department in New York were announced recently by the

FINE WIRE HIGH SPEED WIRE DRAWING SPOOLS



James Day (Machinery) Ltd.,
The Grange, Whetstone,
Nr. Leicester, England

MOSSBERG **PRESSED STEEL** CORP.

A complete line of HEAVY DUTY PRECISION SPOOLS and REELS especially designed for high speed wire drawing and annealing.

The degree of efficiency obtained by the HIGH SPEED WIRE DRAWING MACHINE is largely dependent upon the accuracy and durability of the take-up spool.

The use of our PRECISION SPOOLS will increase your machine efficiency and eliminate your spool difficulties.

Complete range of sizes.

MOSSBERG PRESSED STEEL CORP
18 West Street,
ATTLEBORO, MASSACHUSETTS, U. S. A.

COMBINATION
500 lb. CAPACITY WIRE DRAWING — ANNEALING — STRANDING — REEL.

Jones & Laughlin Steel Corporation, Pittsburgh.

✦ ✦ ✦

C. M. MASON has been appointed District Sales Manager in Cleveland, Ohio, succeeding E. A. France who has retired after 37 years of service with the company. Since October 1938 Mr. Mason has been District Sales Manager in Buffalo, New York. He joined the J & L organization at Pittsburgh in 1919 as an order clerk and in 1925 was transferred to the J & L sales office in Cleveland. He was associated with the Cleveland Office until 1938 when he was transferred to Buffalo as District Sales Manager. **H. B. Shepherd,** who has been associated with the J & L Cleveland Sales Office since 1929, has been appointed Assistant District Sales Manager of that office.

✦ ✦ ✦

E. H. HUGHES has been appointed District Sales Manager in Buffalo. Since April 1938 he has been District Sales Manager at St. Louis and prior to that had been Assistant Manager of Sales, Steel Construction, at Pittsburgh from 1934 until 1938. Mr. Hughes entered the steel business in 1912 with the American Bridge Company and in 1916 started with J & L in the Chicago Warehouse. **G. G. Marshall,** who has been associated with the J & L Buffalo District Sales Office since 1934, has been appointed Assistant District Sales Manager there.

✦ ✦ ✦

L. S. BERKEY has been appointed District Sales Manager in St. Louis. Since 1940 he has been Resident Manager of Sales in Toledo, Ohio. Prior to that he had been associated with the J & L Detroit Office, where he started with the company in 1935. Mr. Berkey has been in the steel business since 1910, having started with the Cambria Steel Company.

✦ ✦ ✦

E. S. LEWIS has been appointed Resident Manager of Sales in Toledo, Ohio. Mr. Lewis has been associated with the J & L organization since 1938, having started in the Pittsburgh District Sales Office. For the past several years his position has been in the General Sales Office at Pittsburgh.

✦ ✦ ✦

P. B. TURNER has been appointed Manager of Export Sales located in New York City. Since 1938 Mr. Turner has been Special Representative attached to the New York District Office. **W. R. Spindler** has been appointed Assistant Manager of Export Sales.

✦ ✦ ✦

N. F. Melville, Manager, Munitions Sales, Pittsburgh Steel Company

N. F. MELVILLE has been made Manager of Munitions Sales for Pittsburgh Steel Co., Pittsburgh, Pa., effective March 1, 1942. He has been associated with Pittsburgh Steel Co. in various sales capacities for the past fifteen years. He continues his duties as Manager of Manufacturers Sales

(*Please turn to Page 210*)

FOR DEPENDABLE UNIFORMITY

SPECIFY **CALLITE**

Callite standards guarantee accuracy in composition, size, temper and finish . . . dependable drawing to specifications of every foot in every carload . . . in sizes down to .002". If baffled by unfamiliar wire problems, don't waste precious time. Let our technicians give you the benefit of Callite's intensive metallurgical research and experience . . . particularly if fine wires of special alloys are involved. If your reputation hangs on wire — be sure it's Callite wire!

CALLITE FINE WIRES
for every need

BERYLLIUM-COPPER
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MONEL
NICKEL-SILVER ALLOYS
BRUSH WIRE
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COMMERCIAL BRONZES
BRASS — ALL GRADES
SILICON BRONZE
SPECIAL ALLOYS

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572 39TH STREET • UNION CITY, NEW JERSEY
branch offices: Chicago, Ill. — Cleveland, O.

A FINE WIRE FOR EVERY NEED

CALLITE TUNGSTEN CORPORATION GT

Outstanding Personalities of The Wire Industry

(*Continued from Page 209*)

which post he has held for the past six years.

✦ ✦ ✦

MR. MELVILLE was basically trained as a metallurgist at Carnegie Institute of Technology. Throughout his business career he has been active in phases of the steel industry, and during the first World War he was a district manager of inspection for Allies munitions supplies including shell steel, barbed wire, tin plate and other materials.

✦ ✦ ✦

F. W. McChesney and Neal L. Parker, Industrial Department General Electric Company

THE appointment of **F. W. McChesney** and **Neal L. Parker** of the Industrial Department, as assistant managers of industrial manufacturers' section sales and machinery manufacturers' section sales, respectively, was recently announced by the General Electric Company.

✦ ✦ ✦

MR. McCHESNEY joined the wire and cable section of General Electric's Central Station department in 1918. In 1940 he became sales engineer of the industrial manufacturers' section.

✦ ✦ ✦

MR. PARKER joined General Electric in 1920 at Lynn, Mass., as a student in the company's electrical engineering course. Since 1937 he has been in charge of the manufacturers' section of the industrial department at New York.

✦ ✦ ✦

A. H. Bond, Co-Ordinator, War Industries Work, Oakite Products, Inc.

IN order to provide information on the latest developments in production cleaning and related manufacturing operations essential to the manufacture of artillery, tanks, airplanes, rifles, shells, cartridge cases, helmets and other direct war goods, Oakite Products, Inc., has named **A. H. Bond** as Co-ordinator of its War Industries Work.

✦ ✦ ✦

C. P. Cutler, Asst. Dist. Mgr., Chicago District, Republic Steel Corp.

C. P. CUTLER, formerly superintendent of finishing mills and special process department of the South Chicago Works of Republic Steel Corp., has been appointed assistant district manager of the Chicago district.

✦ ✦ ✦

Henry C. Beal, Engineer of Manufacture, Western Electric Company

HENRY C. BEAL, formerly manager of the Western Electric Company's Kearny, New Jersey, Works, became engineer of manufacture on March 1st with offices at the Company's headquarters, 195 Broadway, New York City. He was succeeded as

THE WIRE ASSOCIATION

WHAT IT GIVES YOU FOR $10.00 ANNUAL DUES

1. WIRE & WIRE PRODUCTS—For One Year.
   The official publication of The Wire Association covering the Wire Industry; its Metallurgy, Technology, Research, Processes, Machinery and Personnel.
2. THE ANNUAL BUYERS GUIDE & YEAR BOOK OF THE WIRE ASSOCIATION.
   The Year Book Section contains: Constitution and By-Laws of The Wire Association; Details of year's meetings, etc.; List of Members, Index to Papers and Articles in WIRE & WIRE PRODUCTS.
3. QUESTION AND ANSWER SERVICE.
   Answers to technical and operating problems direct by mail. Available to members only.
4. ANNUAL CONVENTION AND EXHIBITION.
   (In Association with American Society for Metals and The National Metal Congress.) Technical Sessions, Plant Inspections.
5. REGIONAL MEETINGS.
   Attendance at the regional meetings which include Local Plant Inspections, Technical Sessions and Discussions.
6. PERSONAL CONTACTS.
   Both at Annual and Regional Meetings, and throughout the year, for interchange of helpful information.
7. INFORMATION SERVICE ON MACHINERY, EQUIPMENT AND SUPPLIES.
   The Technical, Catalogue and Correspondence Files of the Wire Association hold the answer to practically every "Where can I buy" problem. This service is available to members without charge.

For Detailed Information Address

RICHARD E. BROWN—Executive Secretary

300 Main Street, Stamford, Conn.

Works manager by **Reese F. Clifford,** personnel director for the past year. **Arthur B. Goetze,** assistant personnel director, assumed Mr. Clifford's post.

✦ ✦ ✦

WESTERN Electric in 1941 completed the largest manufacturing program in its history and carries a still heavier "war" schedule in 1942.

✦ ✦ ✦

A NATIVE of Indiana and a graduate of Purdue University, Mr. Beal has been with Western Electric for 28 years, having begun his Bell System career as a member of the methods division at the Hawthorne Works (Illinois), where he soon became supervisor of methods, drafting and planning work. He became assistant superintendent of manufacturing planning in 1926 and two years later superintendent of industrial relations. In 1929 he became superintendent of the operating branch at Hawthorne.

✦ ✦ ✦

HE came East to the Kearny Works as assistant Works manager in 1935, taking over the manager's post four years later.

✦ ✦ ✦

MR. Clifford came to Western Electric's Hawthorne Works in 1910 as a price clerk and during the course of the next dozen years rose to become assistant accountant of the Works. After a four-year term as assistant clerical superintendent at Kearny, he returned to Hawthorne to supervise the production of panel dial telephone switching apparatus. In 1938 he was made manager of the cable and apparatus division there. He came to New York as personnel director in March of 1941.

✦ ✦ ✦

PRIOR to his appointment as assistant personnel director at the beginning of the year, Mr. Goetze, who succeeds Mr. Clifford, had been personnel assistant in Western Electric's Sales Department. He, too, joined the Company at its Hawthorne Works and has 25 years of Bell System service. Since 1926 he has held a succession of Sales Department posts concerned with merchandising and personnel activities in connection with Western Electric's chain of 29 distributing houses.

✦ ✦ ✦

Two Experts Named to W. P. B. Steel Branch

TWO men from the steel industry have been appointed to key positions in the War Production Board Iron and Steel Branch.

✦ ✦ ✦

L. S. SIMONS has been appointed executive assistant to the Chief of the Iron and Steel Branch. He was formerly Secretary of the Steel Export Association of New York and made his home in Pittsburgh.

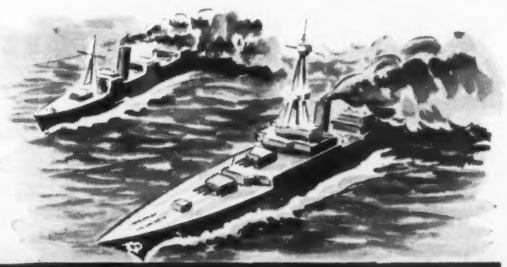
✦ ✦ ✦

H. J. FRENCH has been appointed Senior Technical Consultant in charge of the Metallurgical and Specification section of the branch. He is a member of the technical staff of International Nickel Co. and has been located at New York City.

Donald Nelson warns us that 1942 is Democracy's crucial year and that every weapon we turn out today is worth ten produced next year.

And so it is with wire that provides the very arteries of war machines and communications. Squeeze every possible pound out of the machines you have today! That is where TECO CARBIDE DIES can make a big difference in the amount, accuracy, finish and physical properties of your wire.

Tungsten Electric Corporation makes wire, bar, tubing, extruding and sizing dies—also carbide blanks, tools, bits and special tools. Let us discuss your needs.



TUNGSTEN ELECTRIC CORPORATION
564 39th Street • • • Union City, N. J.
Branch Office: 2906 Euclid Avenue, Cleveland, Ohio
Pioneers in Tungsten Carbides for Over a Quarter Century

WIRE WANTED ----FAST!

You're being asked for more wire than ever before—twice as fast, or more than you ever tried to produce before.

But quality can't suffer. And your costs have to be under control.

That's why it will pay you to investigate

SPECIAL PROBLEMS?

Many of your problems will require a tailor-made compound to meet your specific needs. We will be very glad to work with you along these lines. Just put the problem up to us.

MAGNUS WIRE DRAWING COMPOUNDS

Here is a complete line of wire drawing materials, as complete as the highly specialized problems you have to solve will allow. Every compound in the line has demonstrated its ability to tackle and solve a tough wire drawing problem. The chances are that one or more of these Magnus materials can help you deliver more wire of high quality faster. The proof is a trial.

Ask for our specific recommendations if you have a problem right now—ask us what we would recommend for your particular operations.

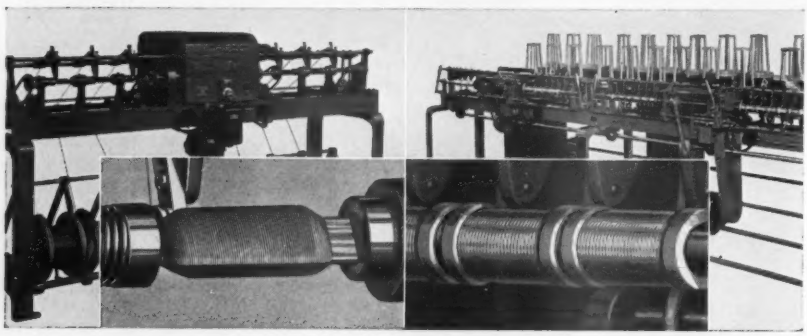
MAGNUS CHEMICAL COMPANY

Manufacturers of Cleaning Materials, Industrial Soaps and Metal Working Lubricants.

188 South Avenue Garwood, N. J.

MAGNUS CLEANERS

WIRE SPOOLING MACHINES



On Sticks or Spools . . . from Reels or Coils

Typical of FIDELITY Spooling Machines that you find serving every spooling-operation need of wire industry, these two new types command attention to advanced achievements in precision winding of the wire onto little flat sticks or conventional spools, at new high production rates and new low spooling cost.

You'll be interested especially in the new FIDELITY hydraulic control which eliminates gear changes . . . so write for Bulletin #61.

WIRE SPOOLING, TAPING, WINDING, SINFRA KNITTING, BRAIDING MACHINES

FIDELITY MACHINE COMPANY

3908-18 FRANKFORD AVENUE, PHILADELPHIA, PA.

Steel Wire Needed for Tanks Flown to England to Maintain Full Production There

(*Continued from Page 202*)

busy and couldn't produce the steel in time.

✦ ✦ ✦

THE American steel maker met the job this way: After a series of transatlantic and American phone calls, the steel ingots were made one morning in an electric furnace in the mid-west and rolled to wire rods. The rods were shipped over-night by a specially chartered express truck to a wire drawing company in New England, drawn into wire and then rushed by a second special truck to another manufacturing plant in New England where the wire was heat-treated to specification. As a result of close teamwork among executives and wage earners in the steel industry, the shipment left the United States by airplane in time to be delivered on schedule to the English bearing manufacturer.

✦ ✦ ✦

SIMILAR emergency shipments from steel plants in this country have made it possible to speed up necessary repairs on American ships which were damaged in accidents or by enemy action.

✦ ✦ ✦

Diamond and Gem Stone Industrial Production

THE above is the title of a new book written by Paul Grodzinski and published by the N.A.G. Press, Ltd., 226 Latymer Court, London, W. 6., England.

✦ ✦ ✦

FOR nearly two and a half centuries gem stones have been used as Jewel-bearings in watches. The use of diamonds and gem stones as dies for fine wire drawing, and of diamonds for cutting tools, is comparatively recent. Today it is extensive and increasing. In this book the author has brought together all the data and information available on the subject and has added the results of his own experience and research. Although dealing mainly with the

actual production of the dies and tools, the knowledge this book imparts is of prime importance to tool users. Efficiency and economy in the use of diamond and gem stone dies and tools is not possible without a knowledge of production methods.

✦ ✦ ✦

IN general the subjects covered are general methods including: Technology of Machining Methods, Dividing of Diamonds and Gem Stones, Bruting, Cutting and Polishing, Drilling and Boring of Holes, Carving and Engraving, Diamond Dust, and Diamond Dust Impregnated Tools.

✦ ✦ ✦

PART 2 is devoted to special manufacturing methods covering: The Manufacture of Diamonds and Gem Stones for Ornamental Purposes, The Manufacture of Watch and Pivot Bearings, Manufacture of Diamond and Hardmetal Dies, Industrial Diamonds, Setting Industrial Diamonds and Grinding and Lapping of Sintered Carbides.

✦ ✦ ✦

THERE are also reference tables and a large number of specially drawn illustrations included in this book. An endeavour has been made to leave no phase of the subject untouched.

✦ ✦ ✦

THE price of the book is 15/-d. in England, plus postage. Readers of this magazine may obtain copies by addressing Book Department, WIRE & WIRE PRODUCTS.

✦ ✦ ✦

Audit and Inspection by WPB Upheld

AUTHORITY of War Production Board agents to have access to the premises and records of a company affected by priority orders was upheld on March 6, 1942, when Federal Judge John P. Barnes in Chicago issued a permanent injunction requiring the Chicago Alloy Products Company to permit audit and inspection by government agents and to refrain from disposing of its stocks of metals until the audit had been made.

700 Spools an hour!

Assembly of Clark *All-Metal* Spools is made under a patented process at the rate of 700 an hour, on either hand or power press. No spot fitting necessary. Thus — increased output, reduced cost.

Clark Spools are strong because of the embossing and curled edges of the ends, nibs in the plug which prevent turning of end on barrel, and because the whole circumference of the barrel is locked into plug and end.

Made in 5″, 6½″ and 10½″ diameter ends; barrels in 1 15/16″ diameter (or special 3½″ diameter for 10½″ end) in any length. Material is cold rolled steel in gauges to meet your demands for strength.

Samples and prices will be sent at your request.

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J. L. CLARK MANUFACTURING CO.
600 23rd Avenue, ROCKFORD, ILLINOIS ★ 901 Chrysler Building, NEW YORK, NEW YORK

NEW — OUTSTANDING!

The Trauwood PROCESS

TEMPERING—PATENTING—ANNEALING

Steel Mill installations for wire and strip have proved these advantages:

- Faster Speeds — Greater Production
- Better and More Uniform Physical Properties
- No Decarburization—Practically No Scale
- Extremely Accurate Control of Heating and Cooling Rates
- Exceptionally High Thermal Efficiency
- Overall Low Cost Operation

Trauwood Electric Wire Tempering and Patenting Unit

Complete Details of the Trauwood Process Will Be Furnished You On Request. Our Engineers Are At Your Service. Write Today.

THE TRAUWOOD ENGINEERING COMPANY
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Have You a Drawing Problem?

WIRE DRAWING LUBRICANTS

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Don't let scarcity of metals slow down your production.

Wood products are being used more and more in place of metal.

For half a century we have filled the wood spool and reel needs of the wire industry.

Let us fill your requirements for SPOOLS and REELS (all wood or metal covered)

BLOCKS, DISCS, DOWELS, HANDLES, IDLER PULLEYS, PLUGS, RADIO PARTS, ROLLERS, WEDGES, and so forth.

Also low-priced non-returnable spools and reels with paper cores.

Send Samples or Drawings For Estimates to

AMERICAN WOOD WORKING COMPANY

1658 No. Lowell Avenue

Chicago, Ill.

Telephone: Belmont 0243

Shot and Bullet Core Steel

THE War Production Board recently issued an order (M-21-f) to conserve the supply and effectively utilize all available facilities for the production of steel for shot and bullet core.

✦ ✦ ✦

THE fulfillment of requirements for the defense of the United States and the prosecution of the present war will result in a shortage of facilities for the production of steel for shot and bullet core and a consequent shortage in the supply of such material for defense, for private account and for export, and it is necessary to utilize effectively all available facilities for the production of such material.

✦ ✦ ✦

BEGINNING March 1, 1942 no producer of Shot and Bullet Core Steel shall make delivery of such material and no person shall accept delivery from a producer except pursuant to an allocation Order issued on Form PD-201 specifically directing such delivery. For the purposes of the Order, Shot and Bullet Core Steel means steel, whether hot rolled or cold finished, to be used in the manufacture of those products.

✦ ✦ ✦

Steel Orders Produced In Sequence

WAR orders for steel must be produced in proper sequence of preference rating regardless of the product involved, presidents of the nation's steel companies have been informed by C. E. Adams, Chief of the Iron and Steel Branch, War Production Board.

STEEL WIRE

By MAURICE BONZEL

✦ ✦ ✦

Translated and Published by

Kenneth B. Lewis

Consulting Engineer

✦ ✦ ✦

Price $15.00

✦ ✦ ✦

495 pages—414 illustrations

✦ ✦ ✦

SEND ORDERS TO

WIRE and WIRE PRODUCTS

300 Main St. Stamford, Conn.

Enlarges Plant for Defense Work

MANUFACTURERS Screw Products, 212-222 W. Hubbard St., Chicago, have acquired another 15,000 square feet of floor space and installed additional screw equipment of the most modern type.

✦ ✦ ✦

THE battery of new machines went into production on March 2nd, and it is stated that the plant is operating virtually 100% on defense orders. These added facilities will enable them to handle

WIRE MILL EQUIPMENT *by* "STANDARD"

TURKS HEADS

Adjustable draw plates—accepted by wire trade as accurate, efficient means of producing rectangular and special shapes. With friction or power driven rolls. Catalog TH.

DRAW BENCHES

8 sizes, 2 general types. Machines are of one-man type with all controls at die end. Catalog DB.

ROLLING MILLS—STRIP AND WIRE

Roller bearing and plain bearing mills; many regular sizes or made to suit user's specific needs. Write fully.

SWAGING MACHINES

For reducing diameter of tubular and solid bar stock into cylindrical, conical, or "necked" shapes. Capacities from ½" tube, ¼" solid to 6" tube or 3¾" solid. Catalog SM.

ALSO

Hand Screw, Foot, and Power Presses; Drop Hammers, and Scrap Bundlers.

✓ your needs for this equipment and write for catalogs.

STANDARD MACHINERY CO., PROVIDENCE, R. I.

ARE YOU DRAWING ROPE, FENCE, NAIL OR REED WIRE?

Concerns doing this work have found that by boiling wire in a solution of Oakite Composition No. 24, before certain following operations, many advantages are obtained that contribute to improved product, shorter time in baking, elimination of rust spots, brighter surfaces.

Our services are freely at your disposal in making tests to see how you can adapt Oakite Composition No. 24 successfully to your type of work. There is no obligation . . . write today.

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Representatives in All Principal Cities of U. S. and Canada

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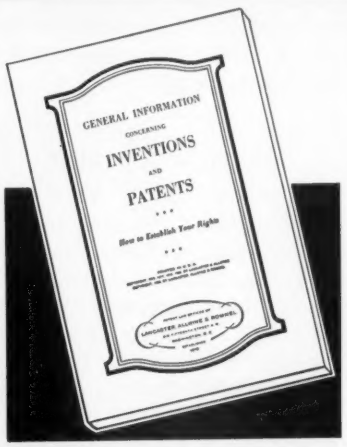
MATERIALS · METHODS · SERVICE



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438 Bowen Bldg., Washington, D. C.

a much larger volume of business in addition to speeding up production.

✦ ✦ ✦

THIS Company manufactures screws, bolts, washers and rivets for ships, tanks, planes, gun mounts and many other essential defense items. They are direct contractors to the United States and Canadian Governments as well as suppliers to prime, and subcontractors.

✦ ✦ ✦

Bulletin on Spring Tester

A NEW bulletin has just been issued by the **Instrument Specialties Company** illustrating and describing the Carlson Electronic Spring Tester, which is said to be the most sensitive instrument yet devised to measure spring characteristics. It measures wire diameter, coil diameter, free length, length under load, hysteresis, set and drift accurately without pressure to 25 millionths of an inch. The instrument is invaluable in cases where accuracy is necessary and tolerances are close, and is claimed to have set standards of measurement heretofore impossible.

✦ ✦ ✦

THE bulletin also describes their "Micro-Processed" beryllium copper springs, giving their properties, telling what can be expected of them in service, setting forth tolerances, and other information of interest to spring users.

✦ ✦ ✦

A COPY of this may be had by requesting Bulletin W, Instrument Specialties Company, Little Falls, N. J.

✦ ✦ ✦

G. L. Crawford, Assistant General Sales Manager Wickwire Spencer Steel Co.

E. C. BOWERS, president of the Wickwire Spencer Steel Company, has announced the appointment of **Gordon L. Crawford**, previously sales manager of the Buffalo district, as assistant general sales manager with headquarters in New York. Mr. Crawford will continue as sales manager of the company's structural products division.

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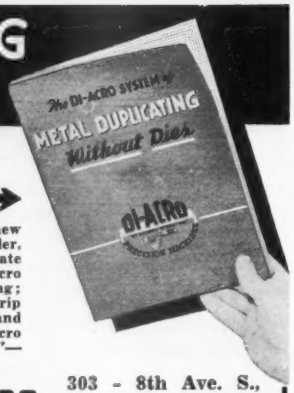

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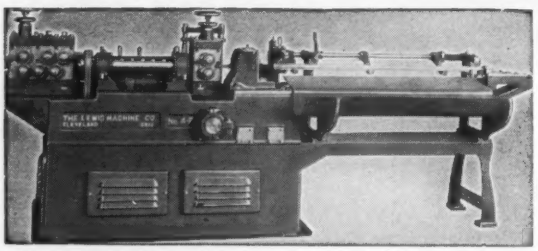

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Wire Association Elects Officers 1942-43

(*Continued from Page 195*)

followed by an intermission and then by a technical session. Because of the great interest in the manufacture of bullet core wire at the present time the technical session will be devoted to this subject.

✦ ✦ ✦

PAPERS will be presented covering:

1. **The drawing of core wire**
2. **The cold heading of core wire**
3. **The casing of core wire**

✦ ✦ ✦

MR. A. R. ZAPP, Manager, Firthaloy Division, Firth-Sterling Steel Company, McKeesport, Pa., is chairman of the committee in charge and the meeting will be held at the **William Penn Hotel** on a date during the latter part of May. The definite date will be announced by letter to the members of the Association.

✦ ✦ ✦

IN both cases there will be a registration fee of $2.50 for each member and guest attending and this registration fee includes cost of the dinner. You buy your own liquid refreshments!

✦ ✦ ✦

Annual Convention

THE **Annual Wire Association Convention** will be held at **Detroit, Mich., October 12th-16th** inclusive in association with the **National Metal Congress** as in previous years. Because of war conditions the meeting will be limited to three days, Monday, Tuesday and Wednesday with the fourth day left open for attendance at the National Metal Congress for those desiring to make a comprehensive survey of this exhibit.

✦ ✦ ✦

THE headquarters of the Wire Association will be at the **Detroit-Leland Hotel.**

✦ ✦ ✦

THE Board of Directors have selected as chairman of the Program Committee, **Mr. A. M. Reeder,** Metallurgical Engineer, Jones & Laughlin Steel Corpora-

tion, Pittsburgh, Penna., and arrangements are now being made to complete the committee and secure the necessary papers for presentation at the meeting.

✦ ✦ ✦

THE general theme of the meeting will naturally be devoted to subjects which will stimulate production for the war effort. Among these subjects will be personnel problems, including human relationship, accident prevention, and plant health conditions due to acids, dust, etc.; papers on latest developments in cold heading, heat treating and wire drawing will also be included.

✦ ✦ ✦

THE **Mordica Memorial Lecture** will be delivered by **Mr. Louis H. Winkler,** Metallurgical Engineer of the Bethlehem Steel Company, Bethlehem, Penna., and following the lecture we will hold the Annual Luncheon of the Wire Association at which there will be three speakers of national reputation who will discuss subjects similar to those presented at the 1941 Luncheon.

✦ ✦ ✦

WEDNESDAY will be devoted entirely to technical papers with the annual Smoker held Wednesday evening in the ball room of the **Detroit-Leland Hotel.**

✦ ✦ ✦

DISCUSSIONS on the papers will be held as usual but in order to stimulate freedom of expression when these are published the **names** of individuals who participate **will not appear** in the printed proceedings.

✦ ✦ ✦

THE questions and answers will simply be listed under the caption "A Member". It is hoped that by doing this we will have a freer and more active discussion than heretofore.

✦ ✦ ✦

Medal Award

IN previous years it has been our custom to have the Board of Directors discuss the papers for the Medal Award at the Director's Meeting held immediately preceding the technical sessions at the Annual Convention. Experience however has demonstrated that this does not give sufficient

(*Please turn to Page 218*)

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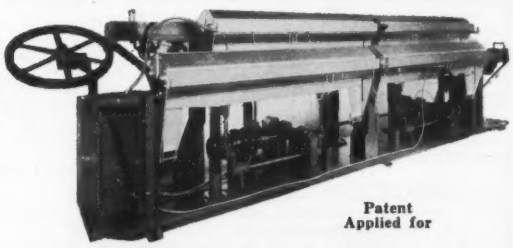

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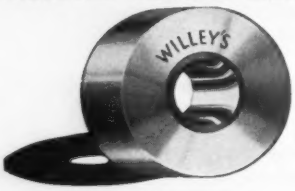

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Wire Association Elects Officers 1942-43

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time for adequate consideration of the research papers submitted and as a result this method of consideration for the award is to be discontinued and a new method substituted.

✦ ✦ ✦

UNDER the new method all papers presented at the meeting or submitted during the year for consideration for the Medal Award will be studied by the Board of Directors during the period from October in which the Convention is held, to the time of the following Directors Meeting which is held March or April following. At that Director's Meeting the papers will be voted on and the Medal Award and Honorable Mentions determined. This means that there will be no Medal Award or Honorable Mention presentation at the 1942 Meeting but that at the 1943 meeting the Medal Award will be made for 1942 and the Honorable Mentions presented in accordance with the decision reached by the Directors at their April 1943 meeting following the Annual 1942 Convention.

✦ ✦ ✦

IN an informal discussion following the Director's Meeting and preceding the Luncheon, it was learned that several companies were in need of planetary strranders. If any members of the Association have such equipment either new or used which is available they are requested to advise the Secretary of the Association who will put them in touch with the companies needing such equipment.

✦ ✦ ✦

Annual Director's Luncheon

FOLLOWING the Director's Meeting, the Annual Luncheon was held at which about 45 were present.

✦ ✦ ✦

A MOST interesting "off the record" address, devoted entirely to his personal views regarding the effort being put forth by the people and by their leaders, was presented by **Col. Frank Bullock,** Signal Corps, U. S A., who then

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2—Shuster Shaped Wire S. & C. Machines ½" & ¾" Square, Hexagon & Round Stock Capacities
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commented briefly on the subject of Powder Metallurgy. He showed some samples of small parts made from powdered metals, which are used in the motors and auxiliaries, being built by the Allison Engine Co. and General Motors Corporation, of large and medium tanks. The parts, consisting of bearings, bushings, oil filters, ball-bearing retainers, oilless bearings, gear and pinion wheels, gaskets, etc., were all manufactured from metal powders. Some of the parts were made of non-ferrous metals, such as copper, bronze, brass, aluminum, and others of steel, both carbon and nickel chrome. Some of the pieces, such as oil filters and strainers, were deliberately made porous for obvious reasons.

✦ ✦ ✦

COL. BULLOCK did not go into details of the manufacture, merely saying that the pieces were all made by mixing powdered metals in the proportion desired, compressing these at high pressure to the desired shape and then sintering at the required temperature. All the parts were made to exact specification, some to within 1/5000 in. All parts were in finished condition as they came from the sintering furnace, and required no machining or grinding or other kind of finishing preparatory to being put into use.

✦ ✦ ✦

COL. BULLOCK stated that one of the most important uses for powdered metals at this time was for making steel bullet cores. The conventional method is to make these cores from drawn wire and then cold-heading. By the use of powdered metals, all of this is avoided and the bullet cores are made directly. Solid cores made from powdered metals have been found entirely satisfactory but, in some cases, difficulty has been encountered in making hollow cores, but this has been of a minor nature.

✦ ✦ ✦

CONSIDERABLE interest was aroused by these remarks and someone on the floor said he looked for a good deal of competition from this source in selling steel wire for bullet cores. However, is was doubted whether such com-

(*Please turn to Page 220*)

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Wire Association Elects Officers 1942-43

(*Continued from Page 219*)

petition would continue after the war.

✦ ✦ ✦

THERE was some discussion regarding the processes used in making the various powdered metals. Col. Bullock said there were two or three well-known methods for making powdered iron, among which the most common are the Electrolytic and the Carbonyl processes He did not discuss products made from non-ferrous powdered metals but added that Mr. Rolle, who was sitting next to him, knew something about the subject and would probably be able to answer any questions in regard to these products Mr. Rolle stated that he would be glad to answer any inquiries on the subject sent in by members of The Wire Association.

✦ ✦ ✦

THE meeting closed with the presentation of motion pictures showing "The Bombing of London", "The Duties of an Air Raid Warden" and "How to Handle Fire Bombs".

✦ ✦ ✦

A Review of Recent Wire Patents

(*Continued from Page 207*)

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Carl-Mayer Corp., The, Cleveland, Ohio.

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Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio

CLOTH TESTERS—
Scott, Henry L., Co., Providence, R. I.

CLOTH—Wire, All Metals
Callite Tungsten Corp., Union City, N. J.

COATING—Protective
American Lanolin Corp., Lawrence, Mass.

WHERE TO BUY, Continued

COILERS—Sheet, Strip and Wire
Broden Construction Co., Cleveland, O.
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Manufacturing Co., The, Torrington, Conn.

COLD HEADERS—
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

COMPOUNDS—Coppering
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Wire Drawing
Oakite Products, Inc., New York, N. Y.
Richards, G. Whitfield, Philadelphia, Pa.
Standard Industrial Compounds Co., Chicago, Ill

CONTROLS—Heat Treating
Niagara Blower Co., Buffalo, N. Y.

CONTROLS—Temperature
Niagara Blower Co., Buffalo, N. Y.

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUSTOM WIRE DRAWING—
Hy-Carbo Steel Co., Lowell, Mass.

CUTTING TOOLS—Carbide
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Vascoloy-Ramet Corp., North Chicago, Ill.

DIAMONDS—Industrial
Callite Tungsten Corp., Union City, N. J.

DIAMOND POWDERS—
Rusch Wire Die Corp., New York, N. Y.

DIAMOND TOOLS—
Rusch Wire Die Corp., New York, N. Y.

DIE MAKING MACHINERY — For Forming Special Shapes
O'Neil-Irwin Mfgr. Co., Minneapolis, Minn.

DIES—Diamond
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Cochaud Wire Die Corp., New York, N. Y.
Fort Wayne Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Krause, F., & Co., Jersey City, N. J.
Rusch Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.
Wayne Wire Die Co., Jersey City, N. J.

DIES—Lead Extrusion
Robertson, John, Co., Brooklyn, N. Y.

DIES—Repairs & Re-Cutting
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Cochaud Wire Die Corp., New York, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Fort Wayne Wire Die, Inc., Fort Wayne, Indiana
Kelly Wire Die Corp., New York, N. Y.
Krause, F., & Co., Jersey City, N. J.
Rusch Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Wayne Wire Die Co., Jersey City, N. J.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Rod and Tube Drawing
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Tungsten Electric Corp., Union City, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Tantalum Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Tungsten Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Tungsten Electric Corp., Union City, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DIRECT ELECTRIC RESISTANCE HEAT TREATING
Trauwood Engineering Co., Cleveland, Ohio

DRAW BENCHES—
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Foundry & Machine Co., Trenton, N. J.
Standard Machinery Co., Providence, R. I.
Vaughn Machinery Co., Cuyahoga Falls, O.

DRUMS—Flange Steel
Stevens Metal Products Co., Niles, O.

DRUMS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

DRYING EQUIPMENT—
Niagara Blower Co., Buffalo, N. Y.

ENGINEERS—Consulting Wire Mill
Hartley, George D., Worcester, Mass.
Lewis, Kenneth B., Worcester, Mass.

EQUIPMENT—Humidifying
Niagara Blower Co., Buffalo, N. Y.

EQUIPMENT—Industrial Cooling
Niagara Blower Co., Buffalo, N. Y.

EQUIPMENT—Insulation Testing
Davis, R. L., Electric Co., Wallingford, Conn.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FINISHES—Wire
Alrose Chemical Co., Providence, R. I.

FLASH BAKER—
Carl-Mayer Corp., The, Cleveland, Ohio.

FLUXES—Soldering
American Chemical Paint Co., Ambler, Pa.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.

FURNACES—Annealing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio
Trauwood Engineering Co., Cleveland, Ohio
Wilson, Lee, Engineering Co., Cleveland, O.

FURNACES—Automatic
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio
Wilson, Lee, Engineering Co., Cleveland, O.

FURNACES—Brazing
Electric Furnace Co., Salem, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Wilson, Lee, Engineering Co., Cleveland, O.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, O.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio
Wilson, Lee, Engineering Co., Cleveland, O.

FURNACES—Electric
Electric Furnace Co., Salem, O.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio
Trauwood Engineering Co., Cleveland, Ohio

FURNACES—Hardening and Tempering
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio
Trauwood Engineering Co., Cleveland, Ohio

FURNACES—Lead Melting
Electric Furnace Co., Salem, O.
Robertson, John, Co., Brooklyn, N. Y.

FURNACES—Non-Oxidizing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio

FURNACES—Normalizing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.

FURNACES—Salt Bath
Electric Furnace Co., Salem, O.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio

FURNACES—Wire, Strip & Sheet
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, O.
Surface Combustion, Div. of General Properties Co., Inc., Toledo, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio

GALVANIZING EQUIPMENT—
Wilson, Lee, Engineering Co., Cleveland, O.

GALVANIZING KETTLES—
National Annealing Box Co., Washington, Penna.

GRINDERS—ROLL
Norton Co., Worcester, Mass.

HI-SPEED BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio.

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

INHIBITORS—
American Chemical Paint Co., Ambler, Pa.

KETTLES — Galvanizing, Annealing, Tinning, etc.
National Annealing Box Co., Washington, Pa.

LATHES—Die Reaming
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

LUBRICANTS—For Metal Cutting Stamping and Drawing
Magnus Chemical Co., Garwood, N. J.
Standard Industrial Compounds Co., Chicago, Ill.

LUBRICANTS—Wire Drawing
Bick, Hans C., Inc., Reading, Pa.
Magnus Chemical Co., Garwood, N. J.
Oakite Products, Inc., New York, N. Y.
Richards, G. Whitfield, Philadelphia, Pa.
Standard Industrial Compounds Co., Chicago, Ill.

MACHINERY — Armoring (Cable, Wire Hose)
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Robertson, John, Co., Brooklyn, N. Y.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Watson Machine Co., Paterson, N. J.

MACHINERY—Brazing
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.

MACHINERY—Bunching
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bundling, Scrap
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Chain Making
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Closing
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coil Winding
Robinson Mfg. Co., Muncy, Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Coilers
Broden Construction Co., Cleveland, O.
Morgan Construction Co., Worcester, Mass.
New England Butt Co., Providence, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Rahway, N. J.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

WHERE TO BUY, Continued

MACHINERY—Copper Wire Drawing and Rolling
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Rahway, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire
Fidelity Machine Co., Philadelphia, Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Cutting
Broden Construction Co., Cleveland, O.
Lewis Machine Co., The, Cleveland, O.
Moslo Machinery, Inc., Cleveland, O.
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Shuster, F. B., Co., New Haven, Conn.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Die Making
Firth-Sterling Steel Co., McKeesport, Pa.

MACHINERY — Die Making for Forming Special Shapes
O'Neil-Irwin Mfgr. Co., Minneapolis, Minn.

MACHINERY—Draw Benches
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Edging
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Extruding
Robertson, John, Co., Brooklyn, N. Y.
Royle, John, & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Flat Wire
Broden Construction Co., Cleveland, O.
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Forming
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Galvanizing
Wilson, Lee, Engineering Co., Cleveland, O.

MACHINERY—Galvanizing Wire
Broden Construction Co., Cleveland, O.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engineering Co., Cleveland, O.

MACHINERY—Gang Winders
Fidelity Machine Co., Philadelphia, Pa.
Robinson Mfg. Co., Muncy, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., Worcester, Mass.

MACHINERY—Insulating
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Knitting
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Lead Encasing Presses, etc.
Robertson, John, Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
Robertson, John, Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Material Handling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

MACHINERY — Measuring Wire & Cable
Davis, R. L., Electric Co., Wallingford, Conn.
Durant Mfg. Co., Milwaukee, Wis.
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Glader, Wm., Machine Works, Chicago, Ill.
National Machinery Exchange (Used), New York, N. Y.

MACHINERY—Panning
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Paper Covering Wire
Terkelsen Machine Co., Boston, Mass.

MACHINERY—Pointing
Broden Construction Co., Cleveland, O.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Foundry & Machine Co., Trenton, N. J.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., The, Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Quill Winding
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Rod Mill
Broden Construction Co., Cleveland, O.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.

MACHINERY—Rolling Mill
Broden Construction Co., Cleveland, O.
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., The, Torrington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Rubber for Insulating Wire
Royle, John, & Sons, Paterson, N. J.

MACHINERY—Rubber Strip Covering
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Screw Wire
National Machinery Exchange (Used), New York, N. Y.

MACHINERY—Special
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, O.
Emory, Robert J., Co., Newark, N. J.
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Foundry & Machine Co., Trenton, N. J.
Standard Machinery Co., Providence, R. I. (Special Designs)
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spooling
American Insulating Mach'y Co., Phila., Pa.
Emory, Robert J., Co., Newark, N. J.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., The, Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
National Machinery Exchange (Used), New York, N. Y.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Straightening
Broden Construction Co., Cleveland, O.
Lewis Machine Co., The, Cleveland, O.
Moslo Machinery, Inc., Cleveland, O.
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Shuster, F. B., Co., New Haven, Conn.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Stranding
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Construction Co., Cleveland, O.
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., The, Torrington, Conn.

Machinery—Swaging
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Testing
Robinson Mfg. Co., Muncy, Pa.
Scott, Henry L., Co., Providence, R. I.

MACHINERY—Testing Size of Wire
Davis, R. L., Electric Co., Wallingford, Conn.

MACHINERY—Testing—Spring
Standard Machinery Co., Providence, R. I.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y. Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Trolley Wire
Torrington Mfg. Co., The, Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Welding Wire
Micro Products Co., Chicago, Ill.
Shuster, F. B., Co., New Haven, Conn.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, O.
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Robinson Mfg. Co., Muncy, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Foundry & Machine Co., Trenton, N. J.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Wire Measuring
Durant Mfg. Co., Milwaukee, Wis.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Robinson Mfg. Co., Muncy, Pa.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Tinning
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Wood Screw
National Machinery Exchange (Used), New York, N. Y.

MACHINERY—Wrapping Wire
Terkelsen Machine Co., Boston, Mass.

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

MILLS—Tandem Rolling and Edging
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., The, Torrington, Conn.

NICKEL SILVER AND PHOSPHOR BRONZE—Rod, Wire and Strip
Hudson Wire Co., Ossining, N. Y.

WHERE TO BUY, Continued

OILS—Wire Drawing
Richards, G. Whitfield, Philadelphia, Pa.
Standard Industrial Compounds Co., Chicago, Ill.

OVENS—Industrial
Carl-Mayer Corp., The, Cleveland, Ohio.
Ross, J. O., Engineering Corp., New York, N. Y.

PANS—Lead and Spelter
National Annealing Box Co., Washington, Penna.

PANS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

PAPER—Creped Wrapping
Crepe-Kraft Co., Newark, N. J.

PAPER TESTERS—
Scott, Henry L., Co., Providence, R. I.

PATENT ATTORNEYS—
Lancaster, Allwine and Rommel, Washington, D. C.

PICKLING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.

PICKLING TANK LININGS—
Keagler Brick Co., Steubenville, Ohio.

PLASTIC TESTERS—
Scott, Henry L., Co., Providence, R. I.

POTS—Lead Melting
Robertson, John, Co., Brooklyn, N. Y.

POWDER—Wire Drawing
Richards, G. Whitfield, Philadelphia, Pa.

PRESSES—Hydraulic and Mechanical
Robertson, John, Co., Brooklyn, N. Y.
Standard Machinery Co., Providence, R. I. (Mechanical Only)

PRESSES—Lead
Robertson, John, Co., Brooklyn, N. Y.

PRESSURE VESSELS—
National Annealing Box Co., Washington, Penna.

PULLERS—Wire
Scudder, E. J., Foundry & Machine Co., Trenton, N. J.

PUMPS—Hydraulic
Robertson, John, Co., Brooklyn, N. Y.

QUENCHING BATH CONTROLS—
Niagara Blower Co., Buffalo, N. Y.

REEL AND TENSION STAND—
Fidelity Machine Co., Philadelphia, Pa.
Moslo Machinery, Inc., Cleveland, O.
Robinson Mfg. Co., Muncy, Pa.
Syncro Machine Co., Rahway, N. J.
Torrington Mfg. Co., The, Torrington, Conn.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS—Annealing and Stranding
American Wood Working Co., Chicago, Ill.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery, Inc., Cleveland, O.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B., Co., New Haven, Conn.
Stevens Metal Products Co., Niles, O.

REELS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS AND SPOOLS—Shipping and Shop
American Wood Working Co., Chicago, Ill.
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS—Takeoff
American Wood Working Co., Chicago, Ill.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery, Inc., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B., Co., New Haven, Conn.
Stevens Metal Products Co., Niles, O.

REELS—Vulcanizing and Impregnating
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B., Co., New Haven, Conn.
Stevens Metal Products Co., Niles, O.

REELS—Wire Drawing
American Wood Working Co., Chicago, Ill.
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery, Inc., Cleveland, O.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REFRACTORIES—High Temperature
Norton Co., Worcester, Mass.

ROD BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio.
Moslo Machinery, Inc., Cleveland, O.
Ross, J. O., Engineering Corp., New York, N. Y.

RODS—Wire—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.

RODS—Wire—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Sheffield Steel Corp., Kansas City, Mo.

ROLL STRAIGHTENERS—
Moslo Machinery, Inc., Cleveland, O.

RUBBER AND RUBBER COMPRESSION TESTERS—
Scott, Henry L., Co., Providence, R. I.

RUST PROOF COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
American Lanolin Corp., Lawrence, Mass.

RUST REMOVING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.

SHEET—Steel
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.

SOAPS—Industrial and Wire Drawing
Magnus Chemical Co., Garwood, N. J.
Standard Industrial Compounds Co., Chicago, Ill.

SPOOLS—Annealing and Wire Drawing
American Wood Working Co., Chicago, Ill.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

SPOOLS—Shipping and Shop
American Wood Working Co., Chicago, Ill.
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

SPOOLS—Steel
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

STAMPINGS—Steel
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRIP—Brass and Non Ferrous
Hudson Wire Co., Ossining, N. Y.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.

STRIP METAL TESTERS—
Scott, Henry L., Co., Providence, R. I.

SWIFTS—Take-off
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.

TANK LININGS—Brick
Keagler Brick Co., Steubenville, Ohio.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TANKS—Steel
Mossberg Pressed Steel Corp., Attleboro, Mass.

TEMPERATURE CONTROLS—
Niagara Blower Co., Buffalo, N. Y.

TENSILE TESTERS—
Scott, Henry L., Co., Providence, R. I.

TESTING INSTRUMENTS—
Scott, Henry L., Co., Providence, R. I.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

TREADS—Safety
Norton Co., Worcester, Mass.

TRUCKS—
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

TUBE BENDERS AND FORMERS—
Ruesch, H. J., Machine Co., Newark, N. J.

TURKS HEADS—Friction and Power Driven
Standard Machinery Co., Providence, R. I.

VULCANIZERS—
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS—
American Insulating Mach'y. Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.

WELDERS—Spot and Butt
Micro Products Co., Chicago, Ill.
Moslo Machinery, Inc., Cleveland, O.

WIRE—Cold Heading
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Sheffield Steel Corp., Kansas City, Mo.

WIRE DRAWING — High Grade Custom
Hy-Carbo Steel Co., Lowell, Mass.

WIRE—Electric
Hudson Wire Co., Ossining, N. Y.

WIRE—Enameled For Coils
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Finishes
Alrose Chemical Co., Providence, R. I.

WIRE—Manufacturers
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Sheffield Steel Corp., Kansas City, Mo.

WIRE—Nickel Silver and Phosphor Bronze
Callite Tungsten Corp., Union City, N. J.
Hudson Wire Co., Ossining, N. Y.

WIRE—Non Ferrous to Specification For Special Purposes
Callite Tungsten Corp., Union City, N. J.
Hudson Wire Co., Ossining, N. Y.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Spring
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Sheffield Steel Corp., Kansas City, Mo.

WIRE—Stainless Steel
Callite Tungsten Corp., Union City, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.

WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Sheffield Steel Corp., Kansas City, Mo.

WIRE AND STRIP—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WIRE TESTERS—
Scott, Henry L., Co., Providence, R. I.

WIRE, WEAVING—Non Ferrous
Hudson Wire Co., Ossining, N. Y.

WRAPPING PAPER—Creped
Crepe-Kraft Co., Newark, N. J.

YARN TESTERS—
Scott, Henry L., Co., Providence, R. I.

WINCO

for magnet wire products that must do the job!

ENAMELED COPPER
ENAMELED IRON
ENAMELED ALLOY
ENAMELED ALUMINUM
TWISTED MULTIPLES
PARALLEL MULTIPLES

SILK COVERED
COTTON COVERED
CELANESE COVERED
GLASS FIBRE COVERED
LITZENDRAHT AND
SPECIALS TO ORDER

● There's more to present day engineering and design problems than shortages of materials, priorities, etc. There is also the question of whether specifications have been rigidly adhered to. Wire, for example, must meet such requirements as specific electrical properties, flexibility, tensile strength, laying speed, uniformity, etc.

Whether it's a buyer's or a seller's market, WINCO magnet wire products are drawn to exact specifications. Uniformity of product is guaranteed by mercury process tests and careful supervision guards against variations in consistency, structure or electrical values.

If you have a wire problem, our complete facilities are at your disposal. Send blueprints or specifications for recommendations, without obligation. Samples sent on request; write today.

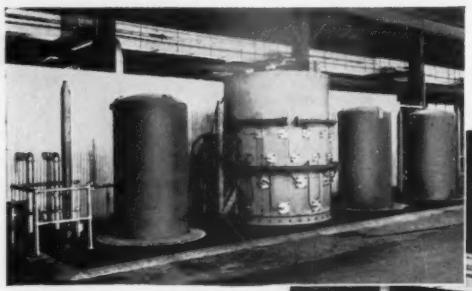
WINSTED DIVISION
HUDSON WIRE COMPANY
WINSTED CONNECTICUT

EF FURNACES

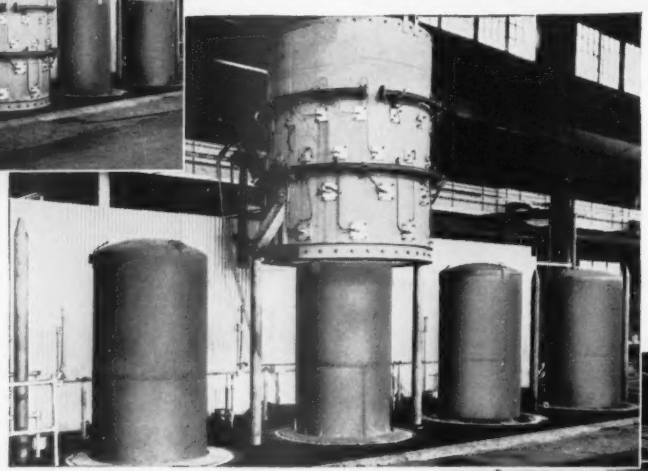
For Every Industrial Heat Treating Process

These EF Gas Fired Bell Type Furnaces

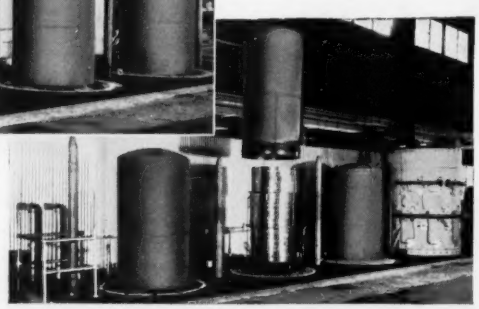
Maintain Uniform Temperature Throughout Charges Regardless of the Weight, Size or Height of Load



(Above) An E F Bell Type Installation consisting of furnace, 4 bases, and retorts.



(Left) Each base accommodates charges up to 22,000 lbs. and coils up to 45" in diameter.



(Right) Removing a retort from base showing bright annealed charge.

For Annealing Strip, Wire and Other Products

Equipped with special EF gas burners and separate automatic temperature control zones, these EF gas fired removable hood type furnaces obtain and maintain uniform temperature distribution throughout the entire charge on each and every load, regardless of weight, size or height of load.

The installation shown above was designed for annealing medium and high carbon mirror-finish cold rolled steel strip, and is equipped with EF gas generator equipment for producing the protective atmosphere for bright annealing without decarburization. Each base accommodates charges up to 22,000 lbs. and handles coils in any width and up to 45" in diameter.

Also furnished for handling wire, rod and other products.

This installation is equipped with a pre-mix plant for mixing the gas and air in proper proportions. This eliminates all manual burner adjustments, as the gas-air mixture is previously obtained in the machine. The high turn down ratio on burners permits use of modulating type control.

This equipment is provided with 4 bases, each with motor driven centrifugal type fans and baffles for effectively circulating the atmosphere throughout the entire charge.

An extremely high rate of circulation is obtained and uniform temperature is provided and maintained regardless of the size or weight of charge. Additional information on the above or on any other type furnace will be gladly furnished on request.

The above is only one of the numerous types we build for various annealing and heat treating purposes. Tank armor castings, shell forgings, cartridge cases, bomb and gun parts, machine gun cartridge clips, aircraft and aircraft engine parts, and many other allied products are being uniformly treated in other EF production furnaces built by the Electric Furnace Company. We specialize in designing and building production furnaces.

We solicit your inquiries.

The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces—For Any Process, Product or Production